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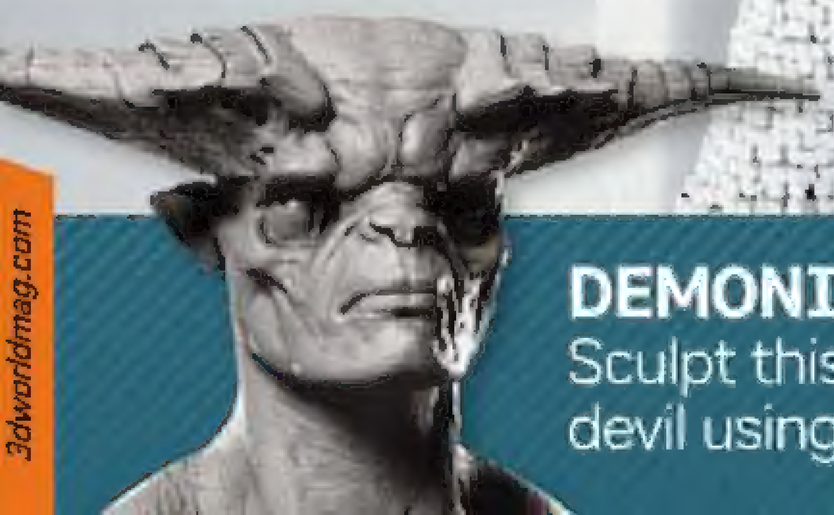
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DIGITAL ANIMATION & VISUAL EFFECTS

Find out how this image was created on page 18

3D WORLD presents Nicolas Richelet

When arch-viz artist and popular blogger Ronen Bekerman and iToo Software got together to promote a competition to create an image using the latter's RailClone Lite plug-in for 3ds Max, it's unlikely they expected to see anything like Nicolas' stunning image 'Falling Apart'. Created by converting a female figure into splines and using RailClone to run thousands of glittering cubes around the form, it transforms the human body itself into architecture.

Creating the render took Nicolas about a day-and-a-half, including testing and concept work. "The part I enjoyed the most was testing the plug-in to see what was possible," he says. "I also enjoyed seeing the final result building progressively."

The judges were impressed enough to award Nicolas second prize in the contest, and we were impressed enough to invite Nicolas to be this issue's 3D World cover artist. On page 18, Nicolas reveals every stage of how the image was made, from discovery to post-production.

nicolasrichelet.com

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2 Seasoned professionals from across the 3D industry write tutorials based on projects created especially for you. We test every step ourselves to ensure accuracy and accessibility.



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Welcome to 3D WORLD

The awards have been handed out and for once we have no complaints



Now that the awards season has drawn to a close, I thought it was time to take a look at the winners and losers in the annual industry back-slap-a-thon. But, for once, I don't have much of an issue with the judges' decisions.

Toy Story 3 winning both Oscar and BAFTA for best animation is hard to contest. Its closest competitor, How To Train Your Dragon, is very highly regarded, but it'd have to have been a genre-defining movie to beat the series that reinvented feature-length animation. That Pixar's magnum opus also managed to be both achingly sad and heartwarming without resorting to the usual Disney tear-jerkery showed real class. Walt must be spinning in his cryogenic chamber.

The Oscar and BAFTA judges also agreed about best visual effects, with Inception scooping both. For me, the film's greatest trick was to fill the screen with effects, both large and small, have them all blend in seamlessly (often unnoticeably), and also leave you wondering how they did it, which is rare for a movie these days. The competition – including Alice In Wonderland, Harry Potter and Iron Man 2 – all managed to impress in different ways, but none of them really left you as wide-eyed as Inception's flexible Parisian streets or zero-gravity corridors!

And the prize goes to...

If you're immune to Facebook, have no time for Twitter, or haven't yet visited our brand new funky website, you may not be aware that our monthly competition just got a whole lot more exciting.

Pixologic has kindly donated a licence of ZBrush 4 to the winner of our challenge. We're also throwing in our own ZBrush bookazine, plus copies of training books by the likes of Scott Spencer and Eric Keller.

This month, you're tasked with producing a 3D creature design. Now it doesn't need to be totally finished; we're looking for a mesh that can be imported into ZBrush for final detailing. So anyone with some basic modelling skills can enter, using any app capable of joining polys together.

We're looking for ideas rather than technique – and with over $700 worth of ZBrush app and training up for grabs, you'd be mad not to have a go!

Steve Jarratt, editor

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Introducing our advisory board

Each issue, our panel of leading figures from across the CG industry give us their advice and help

Meet all of our advisory board members at **3dworldmag.com/board**

Spotlight on...



Andrew Daffy
CO-DIRECTOR, HOUSE OF CURVES

Previously head of 3D commercials at Framestore CFC, Andrew was responsible for projects winning over 30 awards and was voted one of Autodesk's Maya Masters in 2004. He's now co-director of The House of Curves, where, he says, "creating mini drag queens, surfing ducks and racing sharks all constitute a normal working day", thanks to the production studio and training company's 'non-render specific' policy for creating photorealistic and motion graphic work.

For anyone looking at a career in the animation industry, the team at House of Curves has put together a PDF full of useful tips. To download it, visit **thehouseofcurves.com/poster**.

Tim Alexander
VFX supervisor, ILM

Stuart Adcock
Technical art director, Ninja Theory

Jordi Barés
Joint head of 3D, The Mill

Pascal Blanché
Senior artist, Frontier Developments

Tim Brade
Technical director, Aardman Animations

Rob Bredow
CTO, Sony Pictures Imageworks

Gustavo Capote
Art director, Neoscape

Andrew Daffy
Director, The House of Curves

Lee Danskin
Training development director, Escape Studios

Jonathan Davies
Head of 3D production, The Moving Picture Company

Sofronis Efstathiou
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Paul Franklin
VFX supervisor, Double Negative

Andrew Gordon
Animator, Pixar

Eddie Leon
President/CEO, Spine3D

Andrew Lindsay
Director of animation, Lionhead Studios

Stefan Marjoram
Director, Aardman Animations

Jeremy Moorshead
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Alex Morris
Founder, Alex Morris Visualisation

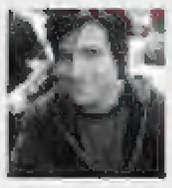
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Creative director, Crystal CG

Shelley Page
Head of International Outreach, DreamWorks Animation

Robi Roncarelli
Editor and publisher, PIXEL

Jolyon Webb
Art manager, TruSim

This issue's contributors



Scott Spencer
DIGITAL SCULPTOR AND DESIGNER, WETA WORKSHOP

Scott will no doubt be busy now that The Hobbit has started filming. This month he starts his sculpting and painting masterclass, and his book ZBrush Character Creation is one of the prizes in our ZBrush Creative Challenge.



Michael McCarthy
ANIMATION INSTRUCTOR, THE NEW ENGLAND INSTITUTE OF ART

Michael McCarthy is a Boston-based 3D artist working in broadcast, feature film and games. He's held classes at SIGGRAPH 2010 and EUE 2010, and his Fundamentals series on lighting continues on page 72.



Vegard Myklebust
FREELANCE MODELLER, RIGGER ANIMATOR AND PROGRAMMER

One third of Useful Slug, Vegard is currently working on the short film 850 Meters, as well as TV ads and music videos for Darkside Animation. His insightful messiahStudio tips can be found on page 74.



Eric Keller
FREELANCE ANIMATOR

Animation generalist Eric puts on his science hat on page 80 and explains how to use the mMaya plug-in to generate cool CSI-style virus imagery. We're also giving away his ZBrush book in this month's Creative Challenge.



Gary Marshall
SENIOR MOTION CAPTURE TD, FRAMESTORE

Gary's first job for 3D World was to pass judgement on IKinema for Maya on page 94. In his day job, Gary is currently working on Alfonso Cuarón's Gravity – a CG-heavy sci-fi thriller set for release in 2012.

3D WORLD

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3D WORLD

Issue 142 *May 2011*

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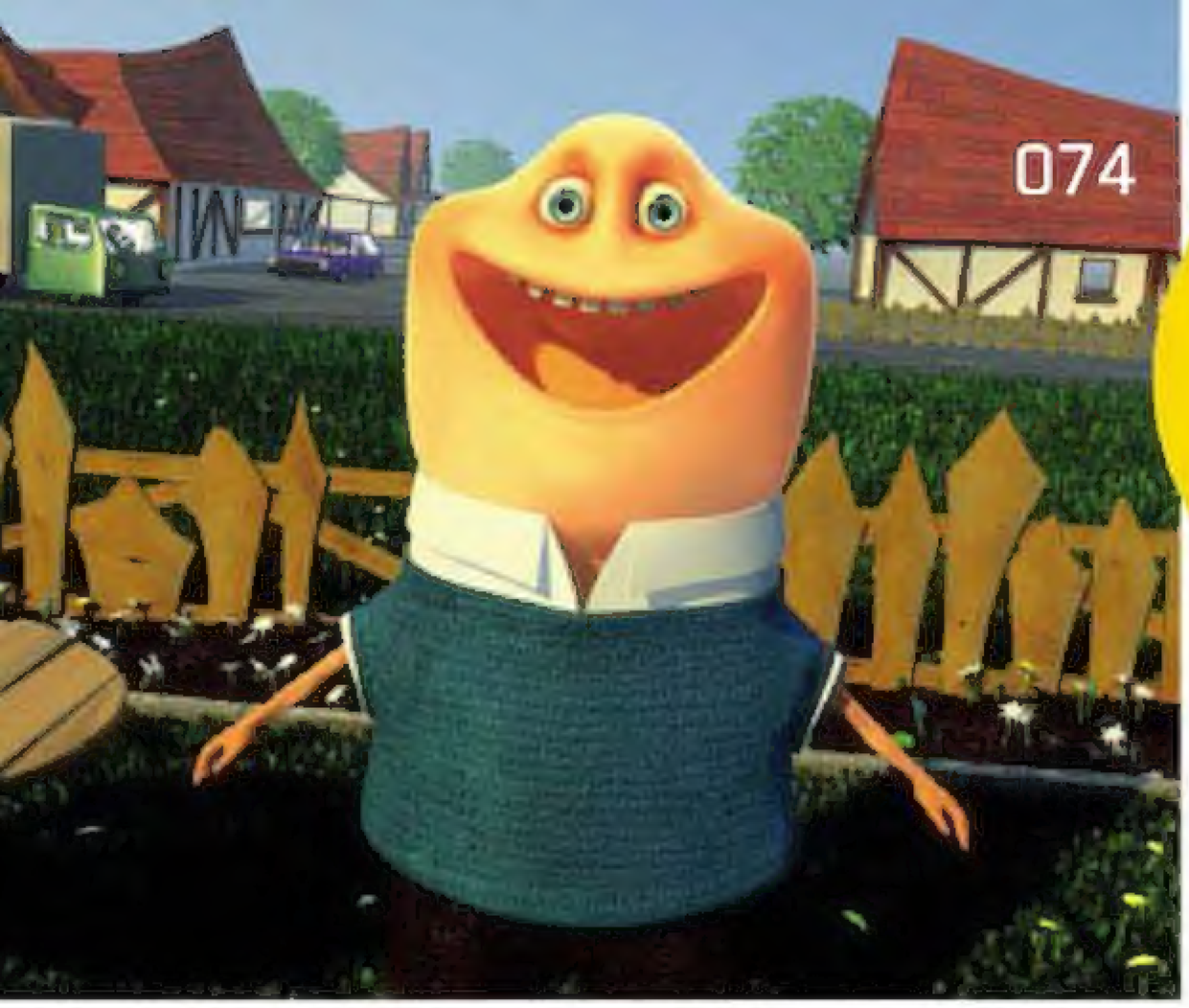
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3D WORLD

Community

Images and opinion from you, the 3D World readers

The end of the street posed a challenge to artist Miguel Cruz, who went through several iterations to get the right look

“I mixed my free time between working on the scene and doing research on tutorials, so I could solve problems and learn a more efficient methodology”

Portfolio

This month's selection of new 3D artwork features the mighty Thor, a Mexican bandit and a cake-munching kid

Artist Miguel Cruz
Title Somewhere in Japan
Software 3ds Max, ZBrush, UVLayout, V-Ray, Photoshop, Fusion

"The image is called 'Somewhere in Japan' because there is no actual place in Japan like this. The scene took six or seven months between freelance projects – I mixed my free time between working on the scene and doing some research on tutorials, so I could solve problems and learn a more efficient methodology. I also did a lot of changes at the end of the street, adding and removing elements until I was satisfied.

"What I was looking for was to place a lot of detail with different elements. While I was making progress on the basic models of the buildings, I was modelling more elements, some of which I didn't even get to use. The inspiration comes from Evernote, while the character in 3D comes from 8YZ design."

[illegible].com



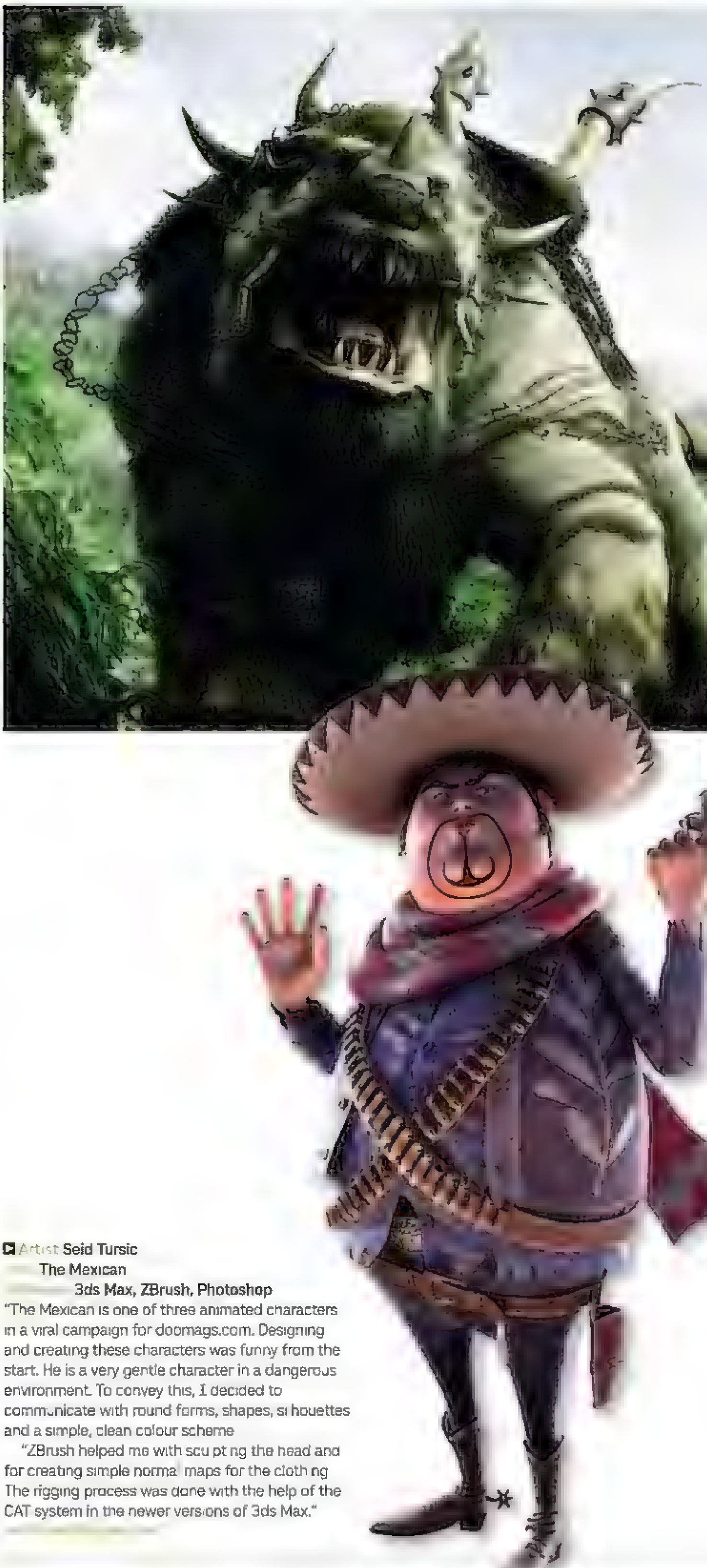
Artist Hugues Thibodeau
Title Thor
Software 3ds Max, ZBrush, xNormal, Photoshop, Marmoset

"I'm a character artist at Beenox, a subsidiary of Activision. This was for the Gamers Assemble Contest Challenge, a fan-based competition. The major difficulty was to fit it in between my family and my job. The biggest technical challenge was my computer, which was quite slow. I overcame that with less sleep and an insane amount of energy drink!

"I used the cloth simulation modifier as a start for the cloak. The bit I most enjoyed was when I was sculpting in ZBrush; each time I create a character, it's the part I prefer the most."

> My computer was quite slow. I overcame that with less sleep and an insane amount of energy drink!

3dvar.dmag.com



Artist **Poiana Marian Alexandru**

Beast Attack

Software **3ds Max, ZBrush, V-Ray with VRayFur plug-in, Photoshop**

"The original 'beast' character was completed last year, and rendered on its own without a background. I only recently finished the final composition with the creature in attack position to look more spectacular.

"The entire project took me about two weeks, with a week-and-a-half for modelling, texturing, rigging, skinning and posing. Then two or three days were spent on the matte painting and some fine-tuning.

"I was very pleased with the VRayFur plug-in that created the beasts' hair and fur: it gives it a natural look in the rendered image."

Artist **Seid Tursic**

The Mexican

3ds Max, ZBrush, Photoshop

"The Mexican is one of three animated characters in a viral campaign for doomags.com. Designing and creating these characters was funny from the start. He is a very gentle character in a dangerous environment. To convey this, I decided to communicate with round forms, shapes, silhouettes and a simple, clean colour scheme

"ZBrush helped me with sculpting the head and for creating simple normal maps for the clothing. The rigging process was done with the help of the CAT system in the newer versions of 3ds Max."

3D Link

Filip Novy wins a copy of Poser Pro 2010, worth $499. Linking pro production tools and ready-to-use 3D assets, Poser Pro saves development time and resources

SmithMicro



66 I find inspiration in old paintings, comics, interesting things that catch my eye. I think an artist can find inspiration in almost everything **99**





Artist **Filip Novy**
Title **Just this last job**
Software **3ds max, Mental Ray, Photoshop, ZBrush**

"This image was created over about five months during the evenings when I could find enough free time and energy to work on it! I can't say for sure, as I've rebuilt many areas several times until it looked as I wanted.

"One of the biggest challenges was the girl's hair. I tried several plug-ins, because I wanted dreads, not a typical haircut. I finally chose old techniques of polygonal modelling with alpha-blended textures, and I think it works quite well."

"I enjoyed almost everything in the project, from the designing of characters through modelling, lighting and setting up materials to final postproduction and detail tweaking."

info@filipnovy.com
filip.cgsociety.org

Karem Yamin

The Sweetest Thing

Maya, ZBrush, mental ray, Nuke

"I have a bachelor's degree in architecture, and I co-founded a small architectural visualisation company in Venezuela. But I'm really passionate about CG art, so I decided to move to Vancouver to study 3D animation and visual effects.

"Creating my demo reel was one of the best experiences of my life. I enjoyed the whole process from the concept design stage to compositing. I'll be graduating from Vancouver Film School, and I'm really hoping to get a job in the industry soon!"

66 It took me six months to design and complete the demo reel. Modelling and texturing the cupcakes was really fun to do! **99**





Artist **Weiye Yin**
Title **Armor**
Software **ZBrush, 3ds Max, Photoshop**

"There's nothing really unusual about the technique used for this project – just that there were so many details. I mainly focused on the area within camera shot to control the amount of this, to ensure smooth progress and to reduce the workload on my computer and myself.

"Every 3D work is a challenge, because it doesn't solely depend on a personal touch like 2D work. Many effects can form by accident; when you want to achieve some effect that you've never done before, studies and try-outs will help you make great progress. I created some effects I've never done before in this piece, and to my satisfaction, they look quite good."

francewo@gmail.com



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If you would like to see your work featured in 3D World, email us at the address below, attaching a lo-res version of the image
portfolio@3dworldmag.com

Portfolio: In focus

Discover how Nicolas Richelet created this issue's eye-catching cover image: 'Falling Apart'



Artist Nicolas Richelet
Falling Apart
3ds Max, RailClone Lite, V-Ray, Photoshop, Magic Bullets PhotoLooks

"This image was created in January 2011 in response to a competition. It took about a day-and-a-half, including testing, creating the concept and producing the final image. I used a free asset from **artist-3d.com** for the body. The chair is from Ronen Bekerman's 'Free Friday' newsletter. The part I enjoyed the most was testing the plug-in to see what was possible; I also enjoyed seeing the final result building progressively.

"I'm a freelance CG artist, working mostly in the architectural visualisation field. I'm working on animations for architecture too. My inspiration comes mainly from architecture and design, but from concept artists who are working on videogames and movies, too.

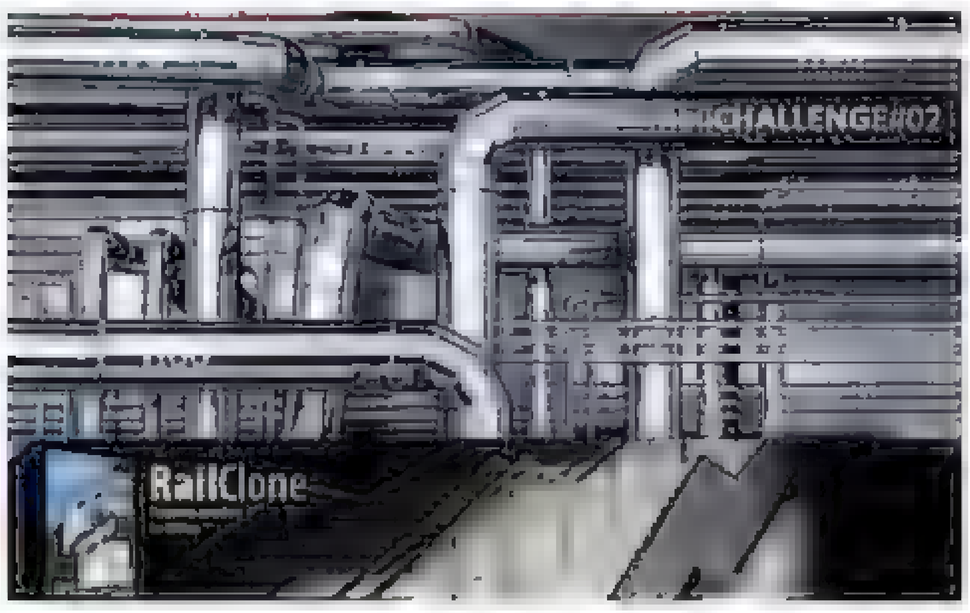
"Many works done in architectural visualisation are always the same, with not much distinctive style between them. My goal is to acquire my own style by studying great artists in general, not only in the architectural field."



Nicolas tried various forms across a human body before choosing the look he liked best

Pre-production

Discovering the image



01 The challenge

The RailClone Mini-Challenge was organised in January 2011 by **ronenbeckerman.com**, a popular blog on architectural visualisation, and iToo Software (**itoosoft.com**). The primary rule was to use iToo's free RailClone Lite plug-in to make an original image, showcasing its use in an architectural visualisation context.

RailClone allows scattering any kind of geometry along splines, and is efficient at making railings, roads, bridges, and even parametric buildings.

02 Exploring ideas

Viewing the video tutorials on the iToo Software website, the first thing I realised is that RailClone could be great in another field beyond traditional arch-viz. I began to test the plug-in with different shapes, trying first to make abstract landscapes with tiny tubes and cubes, in the same way that many people are doing with the Greeble plug-in, for example

03 Decision time

After several unsuccessful experiments, an image of the girl made of tiny bits and sitting on a chair began to emerge. Furniture designers sometimes use appealing models or celebrities to showcase their products, and that was the idea coming in my mind at this moment.



: Nicolas' entry in the RailClone Mini-Challenge won him second prize



Send in your work

Email your images to

portfolio@3dworldmag.com

"I realised that RailClone could be great in a field beyond arch-viz"



04 Choosing a chair

I was going with a Panton chair in the first instance, because of its feminine shape, but I think it has been used too much in art; I needed something more neutral. I finally used the Mermaid Armchair designed by Tokujin Yoshioka. Its shape is still feminine with its curves, but the influence is more subtle.

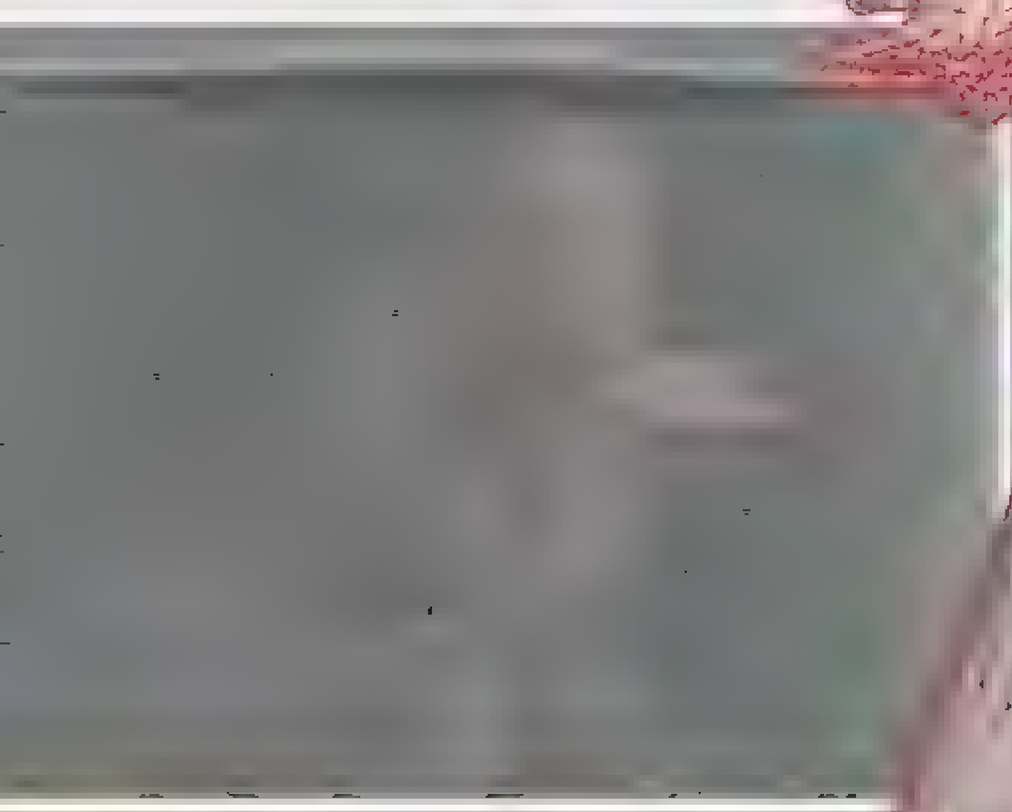


Putting the scene together

Adding the cubes and details

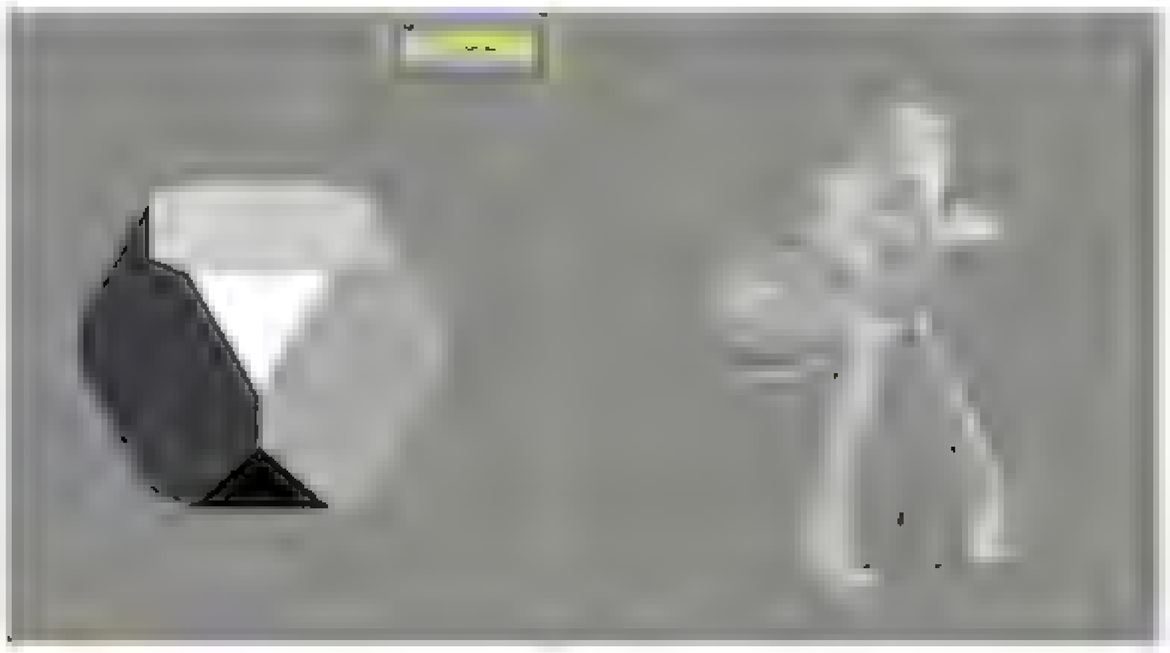
05 Correcting the pose

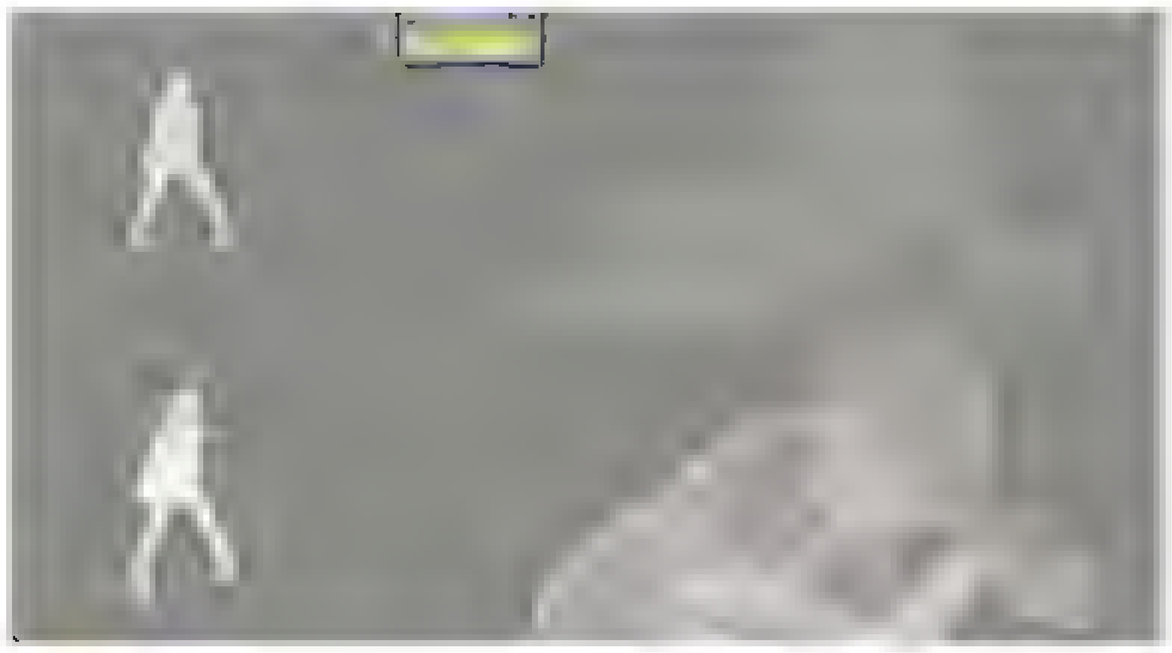
After sitting the girl in the chair, I had to correct the mesh a little bit, because my skinning was not perfect. The angle between the shoulders and the arms was quite distorted, for example.



06 Spline operations

The girl was posed and cleaned; now I had to cut her body in multiple parallel splines. For that, I created an object made of multiple planes, with a 5mm space between them. These planes would allow me, after a Boolean operation with the girl's mesh, to extract the splines where I would apply the RailClone modifier.





08 Spline tests

I tested different shapes along the girl's splines to see what the best result was, the cube was the most satisfying for me. Later, I added a chamfer on the cube corners to add some faces catching light and reflections, to add more interest to the overall image and to define form.

09 Adjusting the details

With the help of the RailClone plug-in, I added some random 3D translation offset on the tiny cubes to make the girl feel more alive, and giving a little sense of motion to her. Now the concept was really starting to feel like it was taking shape.

10 Tumbling cubes

The cubes falling from her hands were not made with RailClone, but with a basic Particle Flow setup. I also added a deflector on the floor to simulate the cubes bouncing a little bit when they touch the ground. A little bit of motion blur, and it was done.





Nicolas used VRayPlanes to implement a basic but effective studio set-up

11 Staging the shot

The lighting setup is a pretty simple studio-like set-up, with VRayPlanes for surfaces and a VrayDomeLight with a black-and-white HDR map for added reflection spots.



12 Photoshop post-production

For the final touches, I added a cool blue, with some sparkles to make my tiny little cubes look like ice cubes or diamonds. I used the Magic Bullet PhotoLooks plug-in for this.



View other examples of Nicolas Richelet's work at nicolasrichelet.com

If you would like to see your work in our Portfolio section, please send your images to: *portfolio@3dmag.com*



Given Gus's icy locale, fur was a necessary – albeit time-consuming and frustrating – element to add

Winds of change

Gus is a short packed with difficult effects and unconventional characters. Kerrie Hughes talks to director Andrew Martin about its production

The occasional spot of flatulence in film is always good for a laugh. Blazing Saddles' campfire scene and every episode ever of South Park are among a long list of films and TV featuring fart jokes in the hope of a light-hearted giggle. Gus is a cheeky new short that follows in their footsteps: its smelly antics are intended to raise a smile or two – but, more importantly, its fart-fuelled message is about standing by the people you love, warts and all.

Written, directed and animated by Andrew Martin, Gus is named after the short's main character, a Neanderthal cave boy who lives with his father, Don. High up in the Swiss Alps, they endure terrible weather conditions after being banished by their tribe due to Gus's uncontrollable flatus. One day, freezing and tired, Don's patience finally runs out, and he sends his son out into the cold: a decision that changes both of their lives.



VITAL STATISTICS
Gus
8:00
Andrew Martin
5 years (part-time)
Maya, After Effects, Photoshop
A young boy born with chronic flatulence is thrown out by his father: a decision that changes both of their lives

Boundin' (Bud Luckey/Pixar, 2003)

The idea for Gus first came about when the director was studying animation and visual effects at the Queensland University of Technology. Brainstorming for his final-year project led him to prehistory, a subject that he has always been interested in, and flatulence. "It's a somewhat disturbing thought, but I guess we draw from inspiration we know," laughs Martin.

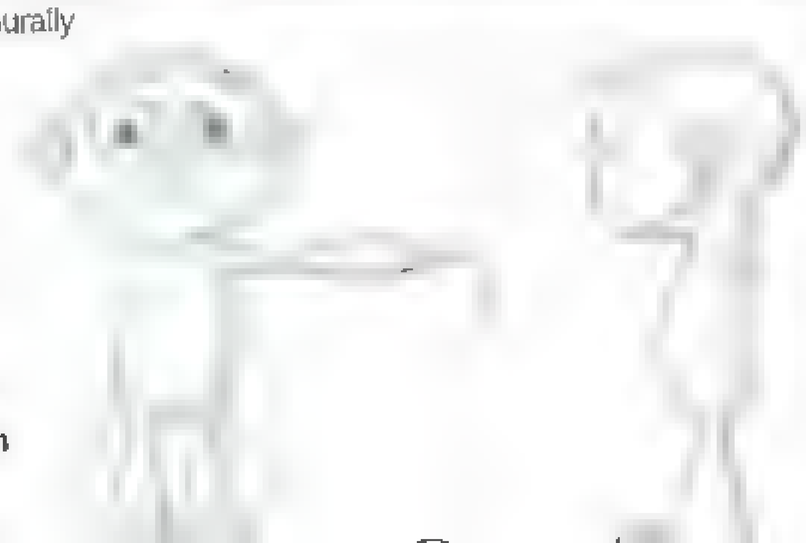
The eight-minute short was almost entirely a solo project, so a simple but effective pipeline and capable tools were vital. Every decision in early production was taken with careful consideration, right down to the choice of 3D software used. "It was important to me to have a single package that could do it all, even if it became frustrating at times," says Martin. "Maya seems to be the most prevalent for animation: it can tackle almost anything."

During a long and sometimes frustrating project, Martin became well aware that it could not be completed totally alone, and recruited assistance for background mattes, hair simulations and the musical score. "I did almost everything you see myself," he says. "I do know my limitations, however, and handed both the sound design and music composition over to some very aurally gifted people."

With the idea established, Martin began working on his character designs. Influenced by claymation and Pixar, Martin aimed to keep them simple: to him, animation is about caricature, not realism.

Giving the characters long arms and short legs to accentuate the Neanderthal look meant they couldn't move in the way real humans do. The rigs that had been designed early on weren't complex enough for the final models, so Martin had to compensate for this by correcting individual frames. "The basic rigs were designed for a different story to what Gus is now, but rather than starting again, I just made modifications on a shot-by-shot basis," he explains.

The many effects in this short meant that overcoming one hurdle only meant another was just ahead. One of the biggest was Maya's fur system. Martin felt that it was a necessary element in the film, but getting it right was a frustrating process. "You have the ability to paint greyscale maps for different attributes as well as the direction, and this is a problem," he says. "Maya interprets 50% grey as one direction, with shades of black rotating it one way and shades of white the other. Consequently, both black and white are interpreted as the same direction – 180 degrees from 50% grey – and when they get together, grey is born and fur gets messy."



Director Andrew Martin was heavily influenced by claymation and Pixar animations in his simple character designs

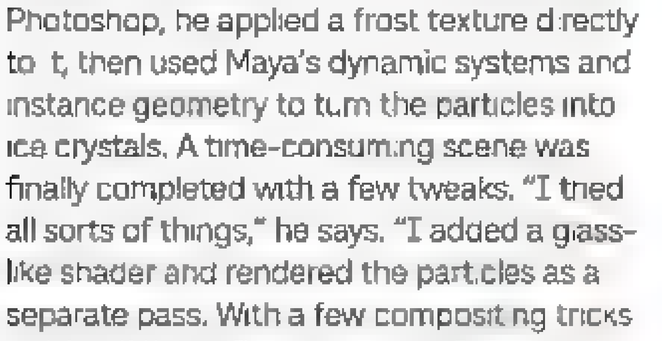
Gus's father Don bears a striking resemblance to his son: he's simply a more angular, older version with hair

The problem with fur was not so much solved as managed by fine-tuning in Photoshop.

The creation of ice was also a job that the director admits was a case of trial and error to get right. The opening scenes feature a tray of frozen meat, which is a difficult enough look to achieve, but Martin had the added complication of having to animate the ice particles when the meat is moved. Using Photoshop, he applied a frost texture directly to it, then used Maya's dynamic systems and instance geometry to turn the particles into ice crystals. A time-consuming scene was finally completed with a few tweaks. "I tried all sorts of things," he says. "I added a glass-like shader and rendered the particles as a separate pass. With a few compositing tricks in After Effects, I got the result I needed."

Now that Gus is finished, Martin is pursuing a career as an animator on feature films. "My focus now is animation and story development," he explains. "But having done it all on this project should help me as a writer, director and producer." ●

Gus is currently on the festival circuit. See an exclusive clip at ***3dworldmag.com/gus***



WATCH THE TRAILER

You can catch the trailer for Gus at the short's official website

KEY TECHNOLOGY

As in many animations, one of the most frustrating parts of Gus was rendering time; the many effects meant this was higher than usual. In an attempt to relieve this, Martin had to think of alternative software solutions to aid him in production. Using the ReelSmart Motion Blur plug-in for After Effects provided a solution to one of the necessary features of the film. "To render motion blur straight out of Maya would have taken forever," says Martin. "The plug-in allowed me to render a separate vector pass and achieve nice motion blur in post. It has its flaws but it's better than having no motion blur at all."

Both Neanderthal characters were designed specifically with long arms and short legs

Early rigs were not always complex enough to provide all necessary movement: modifications were made frame by frame

Send us your shorts

To submit work for inclusion in Short Cuts, contact us at the address below, attaching a brief synopsis and at least three stills

enquiries@3dworldmag.com

Inbox

This month: more love for Blender and a treatise on the art of CG animation. Send your feedback to **inbox@3dworldmag.com**



Issue 140's Blender tutorial was well received – you can expect to see more in future issues

I'm glad you've written a full length tutorial for Blender 2.5 ('Breathe life into a game level', 3D World 140). I use Blender because I can't afford any other piece of software, and it was really good to see you give Blender the attention it deserves. I know that Blender 2.5 is still in beta, which I'm sure has stopped you doing many tutorials for it in the past, but it will soon (hopefully) be stable! I look forward for more Blender tutorials in the future.
Jorge Barros, via email

Given that we know how important Blender is to the 3D community, plus the fact that version 2.5 looks to be the best one yet, you can rest assured that there'll be more Blender content in future.

I have a few questions about your review of the new Apple Mac Pro (3D World 139). I'm looking to get back into CG and architectural visualisation, and would like to be able to develop my skills with 3ds Max and V-Ray.

My current Mac is a 2.4GHz Intel Core 2 Duo with 4GB RAM that's only equipped for 32-bit processing. I'm currently running Windows via the Boot Camp partitioning utility. Unfortunately, this machine is woefully unsuited to producing high-end 3D work. I understand the reasons for my machine's ineptitude are largely because the CPU of this model doesn't support 64-bit Windows. I'm interested in the new Mac Pro, but would like some clarity before I spend the money



The new 12-core Mac Pro is a beast for CG creation, whether running OS X or Windows

Would I be able to take full advantage of 64-bit processing via Boot Camp, and would I be able to run 64-bit versions of Windows, 3ds Max and V-Ray on this machine?

Is there a particular edition of the Windows operating system that I should run to ensure it allows the 3D software to take full advantage of the hardware?

Does Boot Camp enable the 3D software to take advantage of the hardware's multi-threading capabilities?

Is there a slightly lesser machine that you could recommend for someone who is a little more entry-level within the CG industry, but can afford something fairly powerful and wants to stay on the Mac platform? Eight core, perhaps?
Matthew Moult, via email

You can run 3ds Max and V-Ray in 64-bit mode on a Mac Pro using Boot Camp. The ATI Radeon graphics card provided as standard on the Mac Pro offers suitable support for running 3ds Max in DirectX mode.

The only versions of Windows 7 supported via Boot Camp are Home Premium, Professional and Ultimate. All enable you to choose the 64-bit edition during installation.

Yes, any compatible Windows app can use the multi-threading capabilities of the Intel processor in the new Mac Pro. Bear in mind that the most use you get from multi-threading is at render time; few apps are usefully multi threaded throughout at present, so you might be wiser going for fewer cores and a higher clock speed, depending on the work you do.

The latest eight-core machines are absolutely fine for CG work.

My yearly subscription to 3D World ran out a few months ago, but I didn't renew it. I never thought much of it at the time. It's just a magazine (so I thought), it's not the end of the world. A couple of months went past and I started to notice that I was out of touch with the news that my colleagues are all raving about. I was unsure what was happening in the industry, even a little bit lost.

Little did I realise how much I took my 3D World for granted, and how much was jam-packed into it. As soon as I got home, I renewed my subscription and now I wait my little ray of A4 sunshine to pop through my letterbox every month. I will never be without it again!
Theo Theophanous, via email

Thanks for reading and re-subscribing (our latest offer is on page 44). We'll try to maintain our jam-packed-ness!

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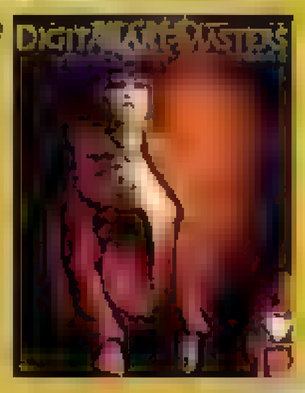
Email us your feedback on the magazine or the state of the 3D industry in general at the address below, including the country in which you live. The sender of the best letter each issue receives a prize
inbox@3dworldmag.com

Letter of the month

With my hectic schedule, I sometimes only manage to pick up issues of 3D World at random. Recently I had a chortle while reading Mental Roy's column in issue 117 – but I would like to answer some of his criticisms.

[In that issue, Roy was sarcastically agreeing with John Knefalusi that CG work is largely "unimaginative and soulless".]

Martin La Grange wins a copy of Digital Art Masters 5, a sumptuous look at the work of the best in the industry



Artistic expression is the crystallisation of a fantastically complex universe into a mental symbol that is readily comprehensible and, more often than not, a mental human abstraction into which the viewer can place themselves. In traditional 2D cartoons and comics, the main characters are abstracted enough that our mental image of ourselves can easily be pasted into the action, permitting us to 'be' the character. But this is hardly a new insight.

A hand-drawn cartoon has the same constrictions, but perhaps in a larger way; with limited budget for salaries, the requirements of telling the story within a minimal natural representation are inherent. With growing commercial success, more money can be invested into technology and man-hours for given projects.

The history of the Disney studio is a case in point – built on excellent shorts and a gamble on technology just introduced in the late 1920s (Steamboat Willie), the studio grew with each new cartoon and invested into researching motion within the natural world (The Old Mill), then embarked on ventures such as the all-cartoon feature (Snow White) and new artistic experiments (Fantasia). This we all know well, but why did Disney's feature-length cartoons disappear?

Blame can be laid at the door of the drivel issued from Hanna Barbera. The desires of the audiences in the late 1950s for TV cartoons changed the directions of all studios seeking commercial dollars: for better or for worse, we got the rubbish from HB, and a rearguard action from Disney in terms of their children's cartoons.

The trajectory of Disney was mercifully halted by Pixar: Toy Story and all that followed we know well. But it's worthy of note that [the advent of CG] created a renaissance in 2D animation for Disney. The technology for 3D permitted streamlined 2D animation, which was no longer hand-driven, but computer-driven. The Lion King and Beauty and the Beast were watersheds for 2D animation in terms of the melding of 3D animation with 2D to provide a superb 2D experience.

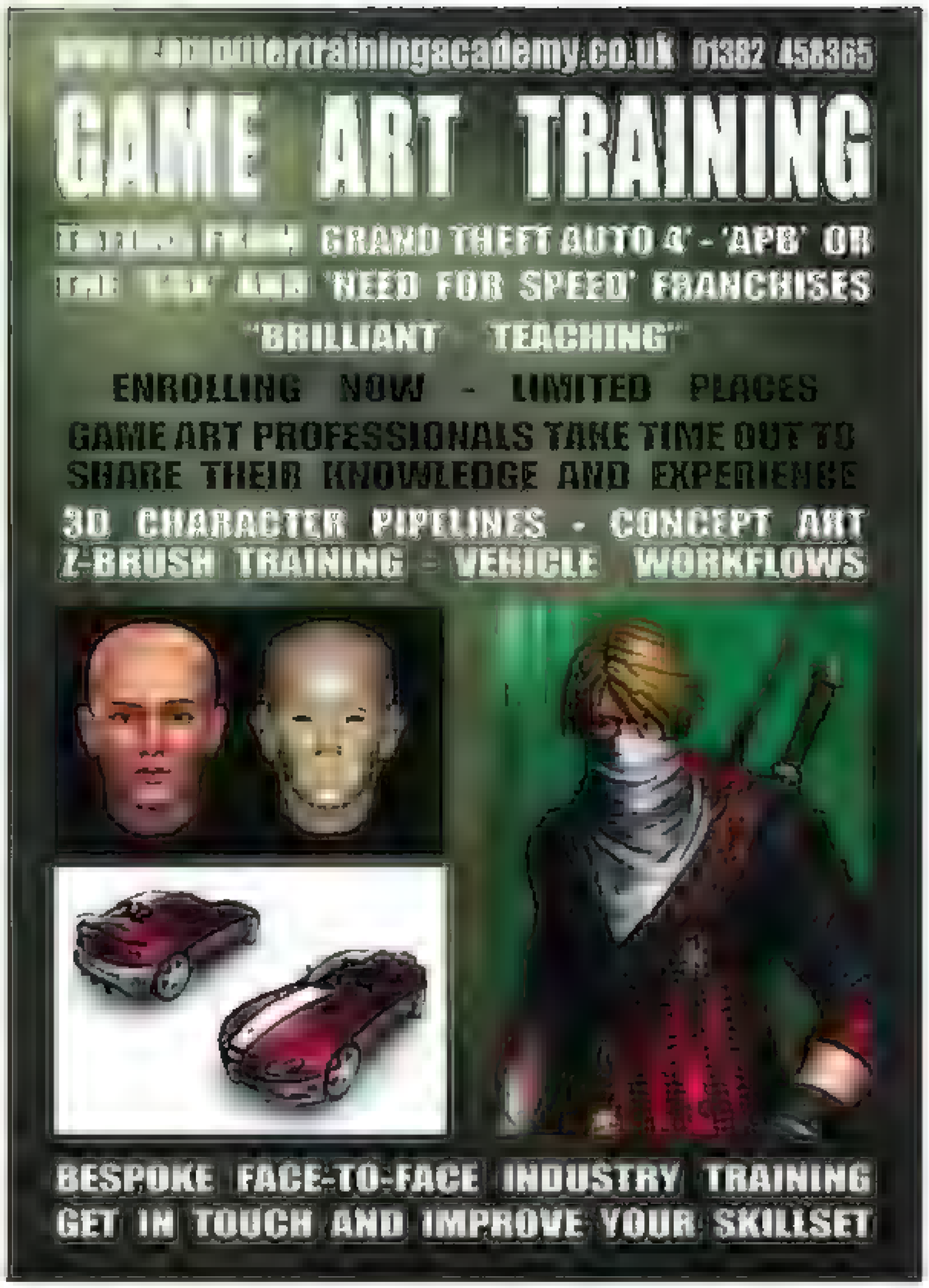
Pixar, of course, proved that computer animation need not be soulless: the characters of all their films and shorts have had the excellent quality of suitable anonymity to permit the viewer to inhabit the character.

In the world of anime, there has been a similar evolution. I disagree with Mental Roy as far as "nearly all anime" being "rubbish". In actual fact, there have been remarkable works, as daring in their way, if not more so, than the work of Disney.

So while 2D animation is important, the application of technology is not soulless. The machine is a reflection of the human intellect, and saves on drudgery: its virtue, not its vice. We can make a further corollary: Sturgeon's Law applies to animation as it does with everything else. Thus, 90 per cent of all animation (whether it be 2D or 3D) will be rubbish. Thus, in 2D, Hanna-Barbera = 90%, excellent stuff = 10%. And in 3D, the same is true, but with a slightly better ratio thanks to the dedication and skills of its practitioners. Hence: rubbish = 75% and excellence = 25%.

Martin La Grange
La Grange Research Ltd

3D World forum
Go online to talk about the hottest 3D trends and share tips. There's a Creative Challenge every month for you to flex your 3D muscles on, too forum.3dworldmag.com





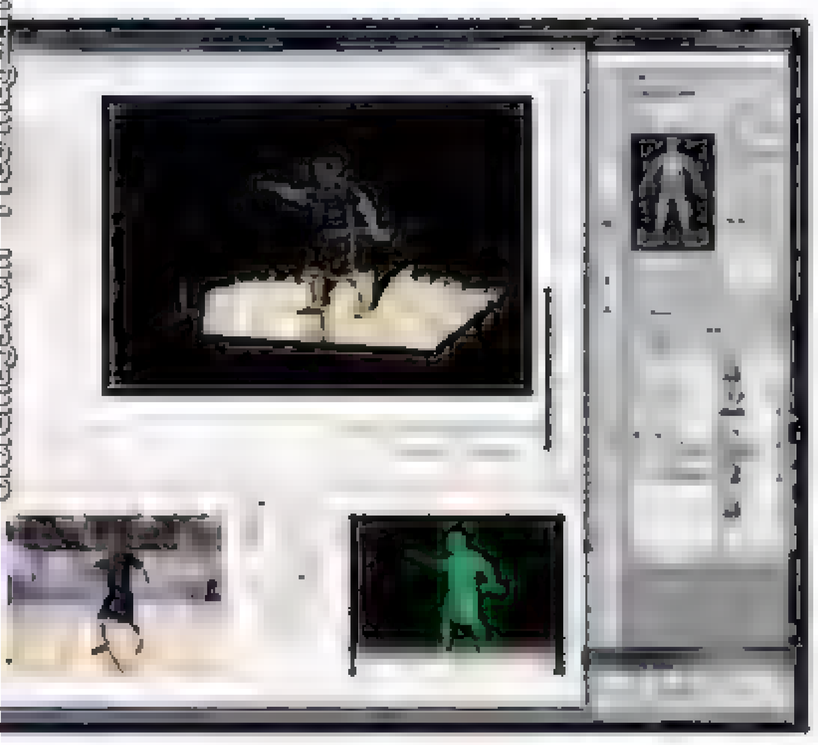




Online series Under the HUD is being completed using stock character models, brought to life via the Kinect and data export tool Brekel Kinect

Only Kinect

Is a $150 games peripheral all you need to record workable mocap data? A new breed of indie artists thinks so – and so does Autodesk



Louis Marcoux's demo of mocap data, recorded from the Kinect and imported to MotionBuilder via Brekel Kinect. Eager viewers mobbed Autodesk with enquiries after seeing it

Kinect began as a broadside in the console wars, but its lasting legacy may be to the motion-capture industry. When it was announced in 2009, most discussion of Microsoft's motion-sensing peripheral for the Xbox centred around whether it could halt the decline in Xbox 360 sales, or how it would perform in comparison to rival technologies from Nintendo and Sony.

Yet the $150 device, which consists of a webcam-style sensor bar on a motorised pivot, and enables users to interact with their Xbox 360 without the need to pick up a controller, has quickly spawned a vigorous open-source development community.

These new software tools enable artists to use the Kinect to record the movements of actors rather than gamers, exporting the resulting data as point clouds, geometry or even standard motion capture file formats.

With February's news that Microsoft is to confer its blessing with the release of an official Kinect SDK, 3D World spoke to this growing band of independent artists and developers to assess what impact their work will have on the 3D industry.

Based on technology developed by Israeli firm PrimeSense, the Kinect uses a system known as Light Coding to calculate depth information. The device continuously projects near-infrared 'structured light' – a known pattern of pixels – and records that pattern with a standard CMOS sensor. PrimeSense's algorithms reconstruct the three-dimensional geometry of nearby objects from the way in which they deform this pattern.

The data, which is immune to variations in ambient light, is captured at VGA resolution at 30 frames per second. The sensor can track objects at distances of between 0.6 and 6.0 metres from the Kinect (in practice, it captures usable data only between 1.2 and 3.5m) and has an angular field of view of 57° horizontally and 43° vertically.

Not a typical specification for a motion capture device, then, but a workable one – as a band of pioneering indie artists were to discover.

State of the art

Luis Calçada is one such artist. By day, he creates technical illustrations for the European Southern Observatory. By night, he records with Luis Clara Gomes as disco house act Moullinex. Realising that their label lacked a video budget for their latest EP, Calçada and Gomes set out to create their own promo for the track 'Catalina'.

"We're both musicians, but at the same time, we're both quite geeky, so we were independently checking all the developments with Kinect," says Calçada. "Although the experiments the community was doing were technical, they were also quite visual. Our idea was to make something coherent from those graphical experiments."

With Calçada handling the graphics, Gomes took charge of coding, building on libraries created by programmer Daniel Shiffman, while a friend helped with editing. Calçada and Gomes doubled as actors in the video, as did Gomes' girlfriend. "The recording was done in her living room," says Calçada. "She was off work sick that day, so she was sitting around at home in her pyjamas watching while we did all the geeky stuff. At a certain point, we said, 'Do you want



to join in now?' And that was it: there was no make-up or anything."

The XYZ co ordinates for the point cloud captured by the Kinect were exported to Cinema 4D as a series of text files; one for each frame recorded. A Python script created by Gomes stripped out background points automatically, leaving around 10,000 per character. The polygon objects derived from the data were rendered using Cinema's Sketch & Toon toolset to achieve a stylised look, with a few finishing touches added in After Effects

Since Calçada already owned the tools necessary – the Kinect itself was a Christmas present – the result is an entire four-minute promo created on a zero budget in just three weeks of part-time work. Although Calçada does not have final sales figures for the EP, he points out that the track has already had over 150,000 views online, particularly on tech sites. "Our intention was not entirely naïve," he says. "We knew that being a technical novelty, it would grab some attention."

"I've been working in the visual effects industry for 15 years, but this is definitely the future. Dude, I'm doing motion capture in my living room!"
Geoff Richardson, producer, Under the HUD

From points to bones

Exporting a point cloud from Kinect is one thing; exporting skeletal motion-capture data is another. For this, the work of Jasper Brekelmans has been crucial. Brekelmans, whose day job is as a character TD at Dutch facility Motek, was inspired to start work on his own software by the original OpenKinect hacking project.

"I started playing with it over Christmas, purely for fun," he says. "Then when PrimeSense released its skeleton tracker, I was interested in comparing the quality against data generated by other mocap systems." The result is Brekel Kinect, a free tool for exporting Kinect data in BVH format, or streaming it into MotionBuilder in real time – a fact that brought the software to the attention of Autodesk technical specialist Louis Marcoux

Intrigued by the videos he saw popping up online, Marcoux resolved to carry out his own tests, recording the results for his blog on the company's community site The Area. Although he says the work was done "purely for fun", Marcoux quickly realised he was on to something bigger. "I filmed in the worst possible conditions for the Kinect: a big open space with fluorescent light, and the guy I filmed [was wearing] Bermudas and short sleeves – but we still got something very decent," he says.

Although the Kinect's field of vision limits its use for full-scale stunt work, it's suited to 'in place' capture: any movement recorded on the spot, from upper-body motion to basic walk cycles. As Marcoux points out, this makes it ideal for reference data. "When animators want to build an animation, they often have reference video, which they put in the background and match the poses," he says. "Now, instead of having reference video, you could have reference animation. The job's already [half] done: they could just delete some of the keyframes or add their own in between frames."

Given a little judicious work with Brekel Kinect's filters and MotionBuilder's own clean-up tools, Marcoux estimates that it would be possible to record "70 80 per cent" of in place animation even on professional jobs, particularly games projects. "A lot of game animations are done in place: walking, turning left, turning right, jumping, and so on," he points out. "So it fits in perfectly with that way of working. If you have 3,000 animations to do for a game, and you can produce them maybe 10 or 15 per cent faster, you're saving a lot of money and time."

While Autodesk's status as a publicly traded company prevents Marcoux from commenting on specific future developments – such as whether we will see plug-and-play support for the Kinect in future Autodesk product releases – his enthusiasm for the hardware itself is anything but guarded. "We're excited by it," he says. "For the very first time, we have a workable entry-level motion-capture device."

KINECT RESOURCES

WANT TO TAKE ON A KINECT PROJECT OF YOUR OWN? THESE SITES SHOULD HELP YOU CAPTURE USABLE MOTION DATA

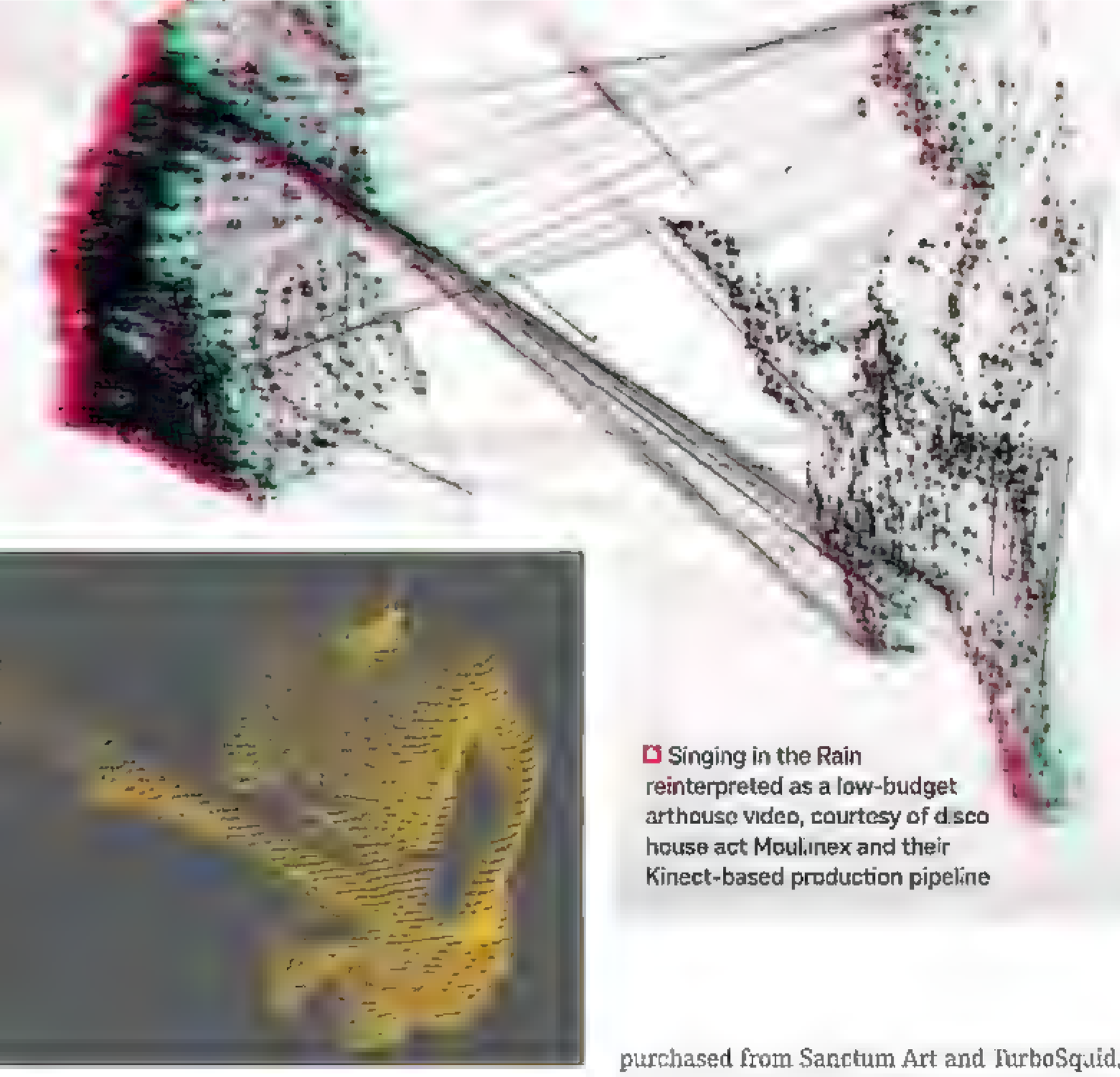
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Daniel Shiffman shiffman.net
Oliver Kreylos idav.ucdavis.edu/~okreylos

CORE TECHNOLOGIES
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OpenNI openni.org
NITE middleware primsense.com/?p=515

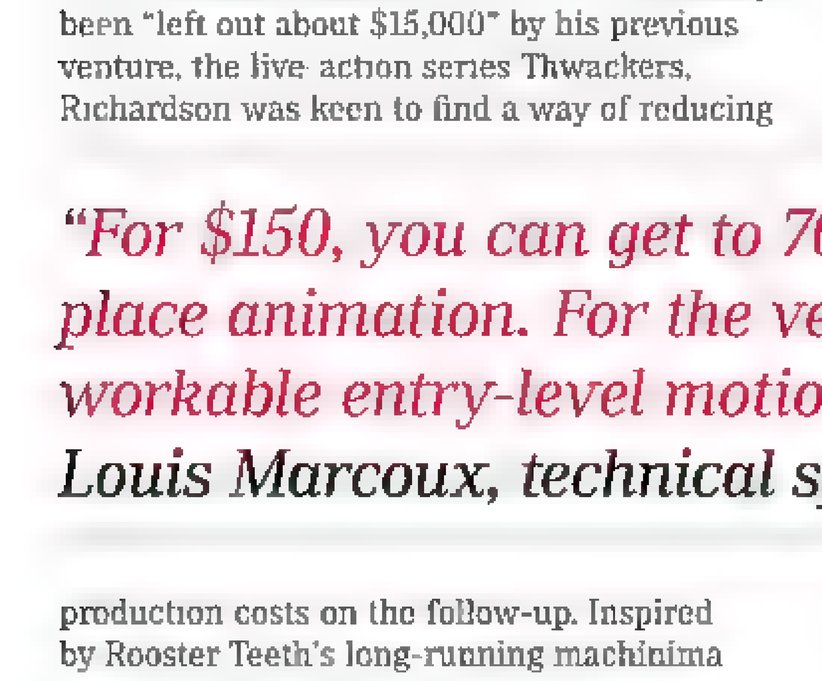
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Singing in the Rain reinterpreted as a low-budget arthouse video, courtesy of disco house act Moullinex and their Kinect-based production pipeline



Point cloud data captured by the Kinect, and imported into Cinema 4D as a series of text files. The early stylistic decision to colour the points was later reversed

Another fan of Jasper Brekelmans' work and an artist deeply influenced by the games industry – is Geoff Richardson, producer of online animated series Under the HUD. Having been "left out about $15,000" by his previous venture, the live-action series Thwackers, Richardson was keen to find a way of reducing production costs on the follow-up. Inspired by Rooster Teeth's long-running machinima series Red vs Blue, but deterred by the legal implications of recording via the Halo game engines, he set out to find a way of working that was machinima-like without actually being reliant on anyone else's proprietary code

Creativity on a shoestring

Brekel Kinect was the solution. Using it to stream processed motion-capture data from his actors into MotionBuilder in real time, Richardson refines the animation further by hand, then adds backgrounds and renders the result in Maya. Since his day job gives him access to the software and a render farm, his only up-front costs have been stock assets: characters purchased from Sanctum Art and TurboSquid, sets from Daz 3D, and additional stock mocap from Truebones

Result: an eight-part series that looks likely to be completed for just $500, excluding labour costs – with four further episodes in development. "Brekel Kinect was a godsend," says Richardson. "My whole project has taken on a new life since then."

To work in this way, Richardson has had to make concessions to the limitations of the technology. Since Brekel Kinect does not support facial capture, the characters have been designed with their faces obscured by Master Chief-like visors. Richardson also tells his actors to keep their hands clenched into fists during recording to prevent unwanted bone scaling, and manually rotoscopes all of the hand, foot and head animation in MotionBuilder afterwards

But it isn't the quality of the data that excites Richardson, and the growing band of independent animators like him: it's the fact that a $150 game peripheral functions as a workable motion-capture device at all. "The data is okay," he says. "But dude, I'm doing motion capture in my living room. The future is here!"

"For $150, you can get to 70-80 per cent of your in-place animation. For the very first time, we have a workable entry-level motion-capture device"
Louis Marcoux, technical specialist, Autodesk

Under the HUD is currently in production. Sneak peeks can be seen at thwackers.tv. Moullinex's Chocolat EP is out on Gomma. Visit the band's website at moullinex.com

WHERE NEXT?

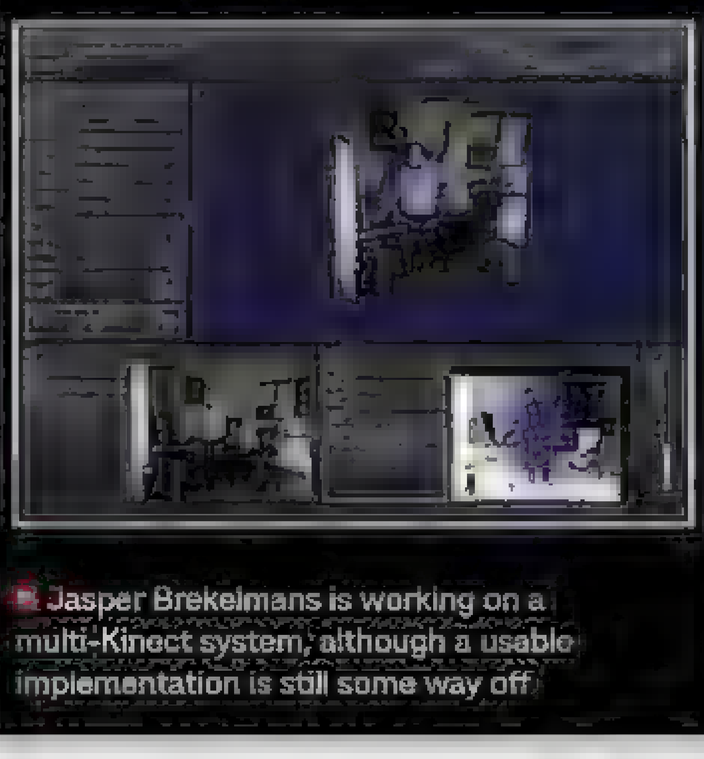
TECHNOLOGICAL RESTRICTIONS LIMIT THE QUALITY OF MOCAP DATA PROVIDED BY CURRENT KINECT EXPORT TOOLS. DEVELOPER JASPER BREKELMANS DISCUSSES HOW THEY MAY EVOLVE IN FUTURE

Although export tool Brekel Kinect is based on PrimeSense's NITE, developer Jasper Brekelmans is keeping an eye on the upcoming Microsoft SDK. "Access to the video and depth streams already has good support, so I'm most interested if Microsoft will give access to its skeleton tracker," he says. "Since this is still a fairly young area of research, the biggest improvements will come [from that area]."

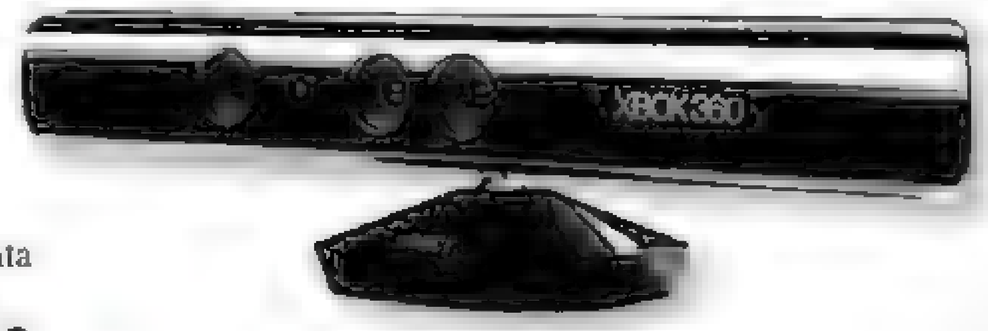
Facial tracking is a bigger issue. Brekelmans says he's not planning to support it. "Most research in this field, including presentations from Microsoft's Avatar project, use video-based tracking rather than 3D point clouds."

Brekelmans is also experimenting with using multiple Kinect units to capture data. "I have hooked up two Kinects," he says. "It's still quite finicky, but I'm sure that will improve when the drivers mature."

A usable multi-Kinect implementation is still some way off, however. "Because of the way the Kinect's structured light principle works, there is interference when using multiple Kinects at the same time, although it seem to be manageable when using only two or three devices," says Brekelmans. "At the moment, there is no way to synchronise the devices, so they may send samples that are a few milliseconds apart, which has an impact on quality. When using multiple devices, you have to calibrate them to figure out where they are in relation to each other."

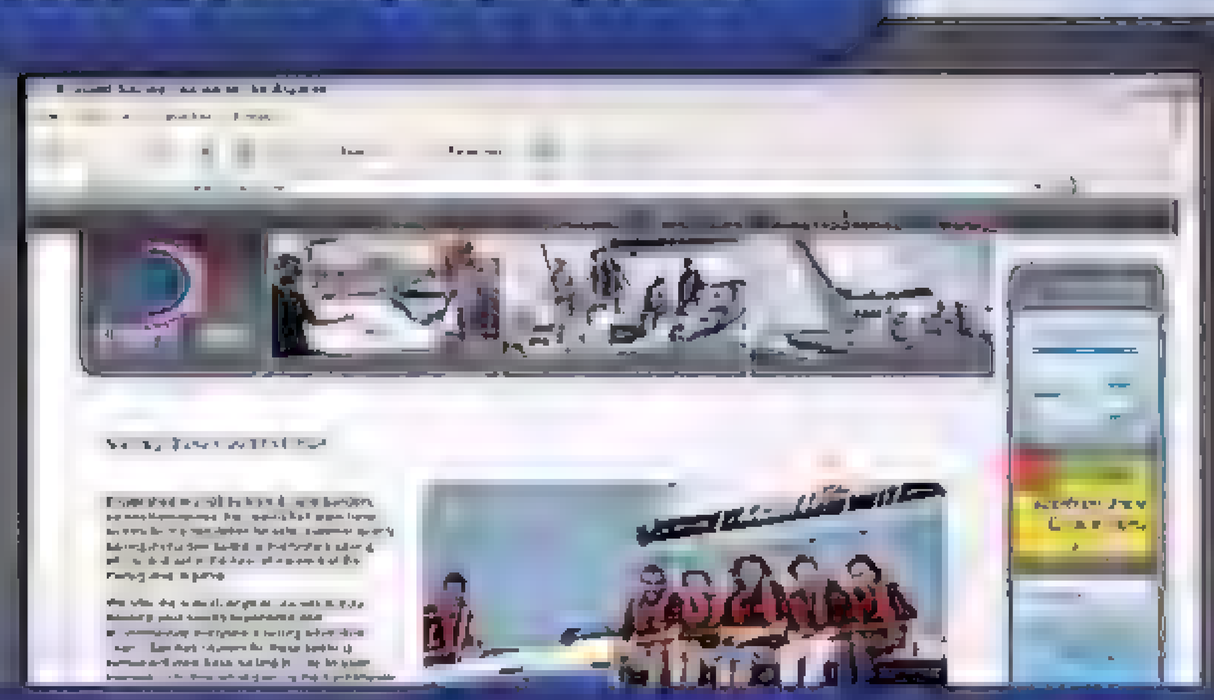


Jasper Brekelmans is working on a multi-Kinect system, although a usable implementation is still some way off



Microsoft's Kinect started as a way to enable Xbox gamers to play without holding a controller, but the impact that's been made by unofficial tools has prompted the company to create a developer kit

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The Filter

Our pick of the past month's 3D software and training resources, ruthlessly stripped of PR hyperbole. Visit 3dworldmag.com for more product stories and all the breaking news



Maya 2012

DEVELOPER: Autodesk
WHAT IS IT? Update of the leading 3D animation and rendering package
WHAT'S NEW?
- Viewport 2.0 provides high-quality scene previews
- Motion trails now directly editable on-screen
- Improved particle and dynamic simulations
- Support for vector displacement mapping

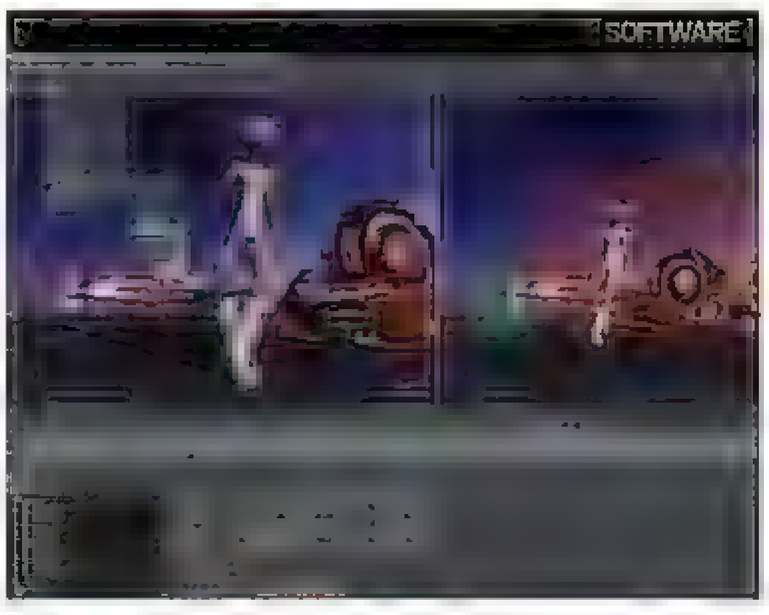
THEY SAY: "We have continued our long-term focus on improving production efficiency as well as real-time creative iteration, with enhancements to the viewport addressing new trends in previsualisation, virtual moviemaking and games prototyping"
WE SAY: The ability to view animation, complete with effects and shaders in near real-time, should be a real benefit to any user. The improved simulation and HumanIK tools look great too
PRICE: $3,495; upgrade from Maya 2011, $1,745
MORE ONLINE: autodesk.com



Softimage 2012

DEVELOPER: Autodesk
WHAT IS IT? New version of the character animation and visual effects application
WHAT'S NEW?
- ICE modelling non-destructive geometry creation
- Construct effects more quickly with ICE FX builder
- ICE support for Syflex cloth simulations
- New UV relaxing and pinning options

THEY SAY: "In addition to established recent favourite features such as Face Robot and Lagoa Multiphysics, the new version reflects the continued expansion of ICE, as well as the next-generation GigaCore 3D engine. This release will definitely be cause for some major excitement"
WE SAY: With loads of cool new features, plus one-click sharing of assets between Autodesk apps, Softimage continues to go from strength to strength
PRICE: $2,995; upgrade from Softimage 2011, $1,495
MORE ONLINE: autodesk.com



MotionBuilder 2012

DEVELOPER: Autodesk
WHAT IS IT? Updated version of the real-time 3D character animation software
WHAT'S NEW?
- Stereoscopic display and camera rig with camera data exchange between Autodesk programs
- Consistent HumanIK workflow makes it easier to move between MotionBuilder and Maya
- Addition of Autodesk-standard f-curve editor

THEY SAY: "MotionBuilder 2012 software delivers new tools for virtual movie-making, performance animation, and stereoscopic productions, and enhanced interoperability with other products in the Autodesk Entertainment Creation Suite"
WE SAY: The most beneficial feature is the 'Send to' command, which enables you to transfer files to Maya and 3ds Max without having to export to FBX
PRICE: TBC
MORE ONLINE: autodesk.com



3ds Max 2012

DEVELOPER: Autodesk
WHAT IS IT? New version of the leading 3D package
WHAT'S NEW?
- Enhanced UVW unwrapping tools
- Nitrous Accelerated Graphics Core for high-quality, interactive previews and non-photorealistic renders
- mRigids PhysX-powered rigid-body simulations
- Sculpting and painting toolset enhancements, with support for vector displacement

THEY SAY: "3ds Max 2012 delivers powerful tools that take advantage of recent hardware advances, along with better interoperability with other products in our Entertainment Creation Suites. Together these enhancements help artists to make creative decisions early, validate them and deliver better results faster."
WE SAY: This update promises smoother workflow, better previews, and faster simulations thanks to Nvidia PhysX support. Let's hope iray is fixed too...
PRICE: $3,495; upgrade from 3ds Max 2011, $1,745
MORE ONLINE: autodesk.com



Mudbox 2012

DEVELOPER: Autodesk
WHAT IS IT? Updated version of the 3D digital sculpting and painting software
WHAT'S NEW?
- UV-less painting allows complex assets with multiple meshes to be textured as Ptex files
- Create, manage and weight multiple joints to deform and pose full-figure models
- New texture and tile management system supports large texture datasets and highly detailed assets

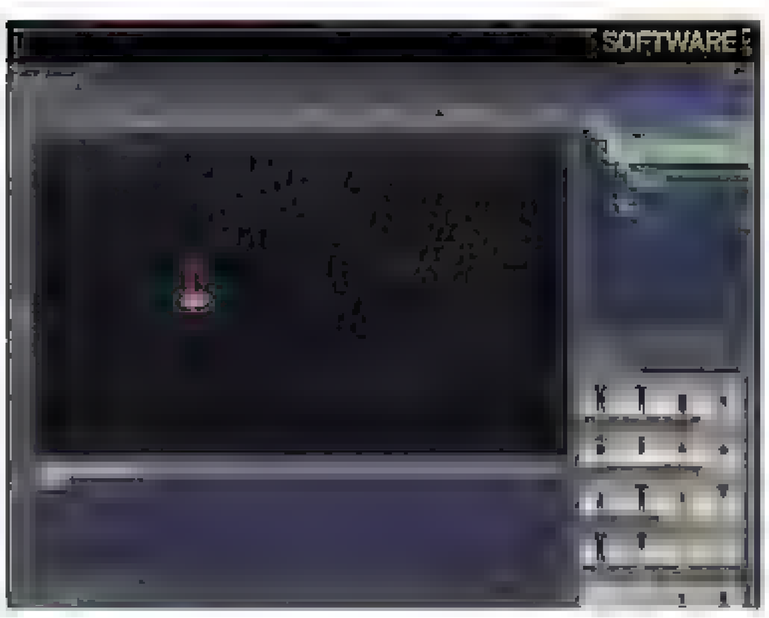
THEY SAY: "Mudbox 2012 software delivers enhancements to the painting toolset; innovative new UV and topology independent workflows; practical posing tools; and improved performance and large dataset handling"
WE SAY: Support for Ptex, vector displacement and huge, multiple texture files make this the most production-friendly release of Mudbox to date
PRICE: TBC
MORE ONLINE: autodesk.com



Xara 3D Maker 7

DEVELOPER: Xara
WHAT IS IT? New version of the software that creates high-quality animated 3D text
WHAT'S NEW?
- New scroll animation type for credit sequences
- Exports animations with a transparent background for easy compositing
- Seven new bevel types added

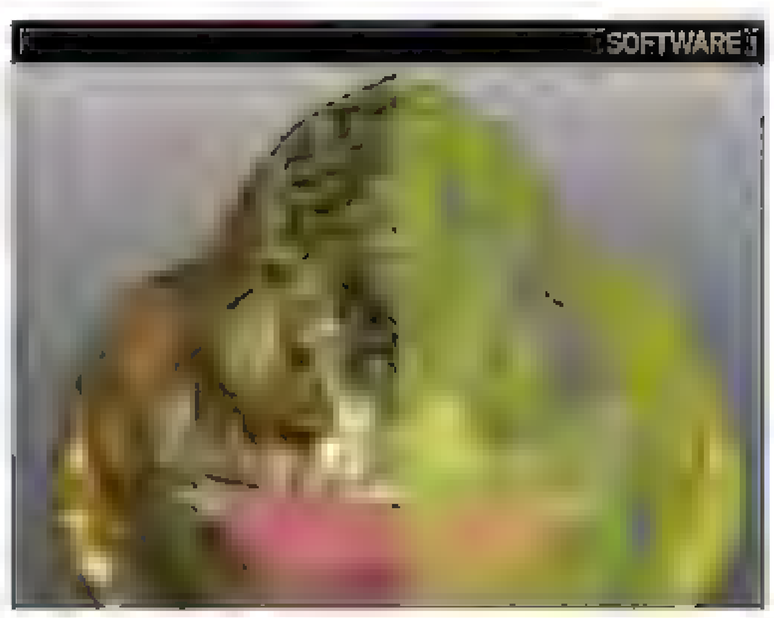
THEY SAY: "Xara 3D Maker has been created to perform one job – create stunning 3D text – and it performs that job with style, speed and simplicity. One of our most popular products, it's affordable for anyone wanting to create high-quality 3D headings and logos in seconds"
WE SAY: Most apps can generate 3D text, but probably not as easily and as quickly as Xara 3D. At this price, it's a steal for movie makers or web designers on a budget
PRICE: £29.99
MORE ONLINE: xara.com



an(i)ma

DEVELOPER: aXYZ design
WHAT IS IT? Crowd simulator for 3ds Max and C4D
MAIN FEATURES
- Agent libraries include digital actors controlled by motion-capture data for realistic animations
- CrowdCloner can be used to simulate the behaviour of a large number of characters
- Collision Brain Engine uses sophisticated AI to predict collision between characters

THEY SAY: "an(i)ma's motion-editing tools and content make 3D character animation easy and affordable, and enable creative and technical artists to take on demanding animation-intensive projects"
WE SAY: Although designed for arch-viz, this software could have a much broader appeal. At a considerably lower price tag than its rivals, an(i)ma provides a simple solution to crowd simulation
PRICE: $339; advanced, $509; premium, $739
MORE ONLINE: axyz-design.com



Shade 12

DEVELOPER: Miyre Software
WHAT IS IT? Update to the 3D creation app
WHAT'S NEW?
- Displacement and normal mapping
- Now includes volumetric materials, volumetric lights and sub-surface scattering
- Improved modelling with support for mirror and magnet tools, Booleans and sketch modelling

THEY SAY: "Use Shade as a standalone toolset or as a key design tool in your existing workflow. Every feature of Shade lets you work faster to produce high-resolution, high-quality art and animation"
WE SAY: This 3D package is relatively unknown in the West, but with the new image-based modelling system, support for volumetric materials and an affordable price tag, maybe it's about time we got to know it a little better
PRICE: $99; standard $349; professional $749
MORE ONLINE: miyre.com

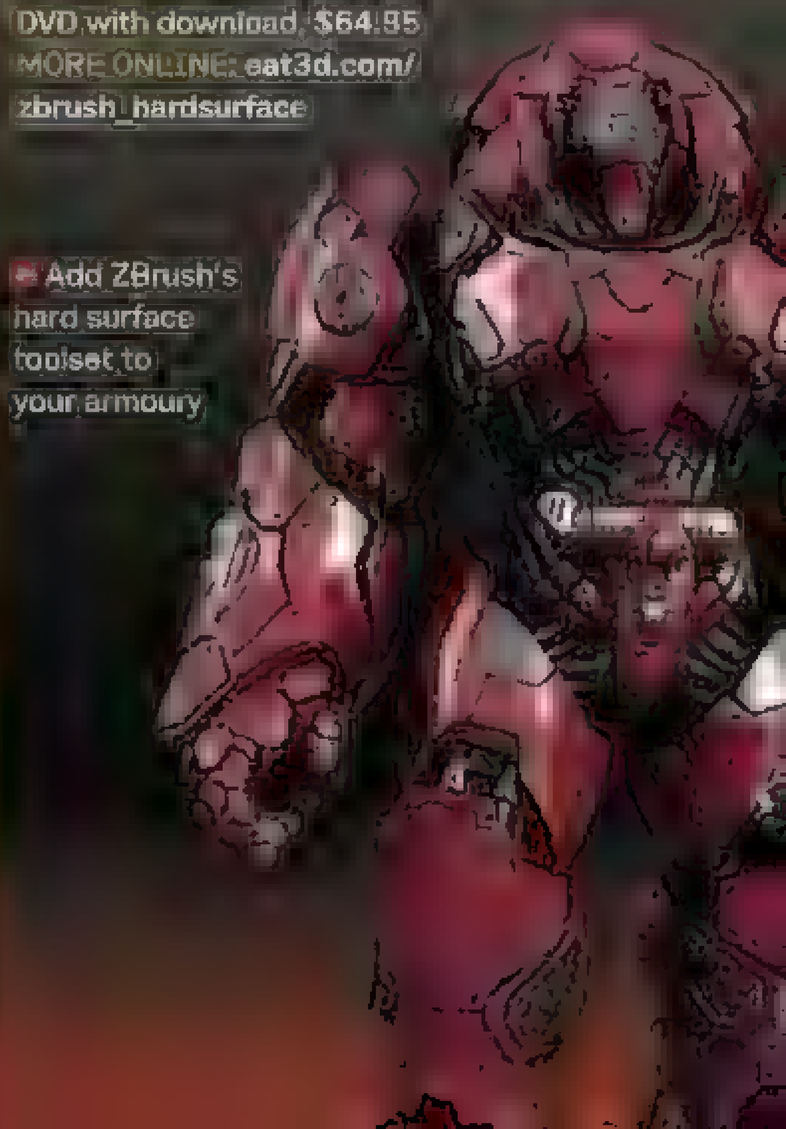
Training product of the month



ZBrush Hard Surface Techniques

This DVD consists of nearly eight hours worth of tutorials in which instructor Mike Jensen goes into great detail on many hard-surfacing techniques in ZBrush. The training covers an in-depth look at features such as customised UIs and creating meshes before going right through the entire process of creating a mechanical character. Mike then goes on to import the model into 3ds Max and uses V-Ray to create materials and render out separate passes with the final composition completed in Photoshop.
Watch nearly an hour of video training from ZBrush Hard Surface Techniques on this issue's disc; see page 112 for more details
PRICE: Download, $59.95; DVD with download, $64.95
MORE ONLINE: eat3d.com/zbrush_hardsurface

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Good advice

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THE MAKING OF BATTLE: LA

///The nightmare of a decades-long conspiracy on Jonathan Alexander's new movie

Battle: Los Angeles, Kevin Hughes talks to director Jonathan Liebesman and SFX VFX

about the challenges surrounding the creation of full-on combat sequences in

a documentary-style film///



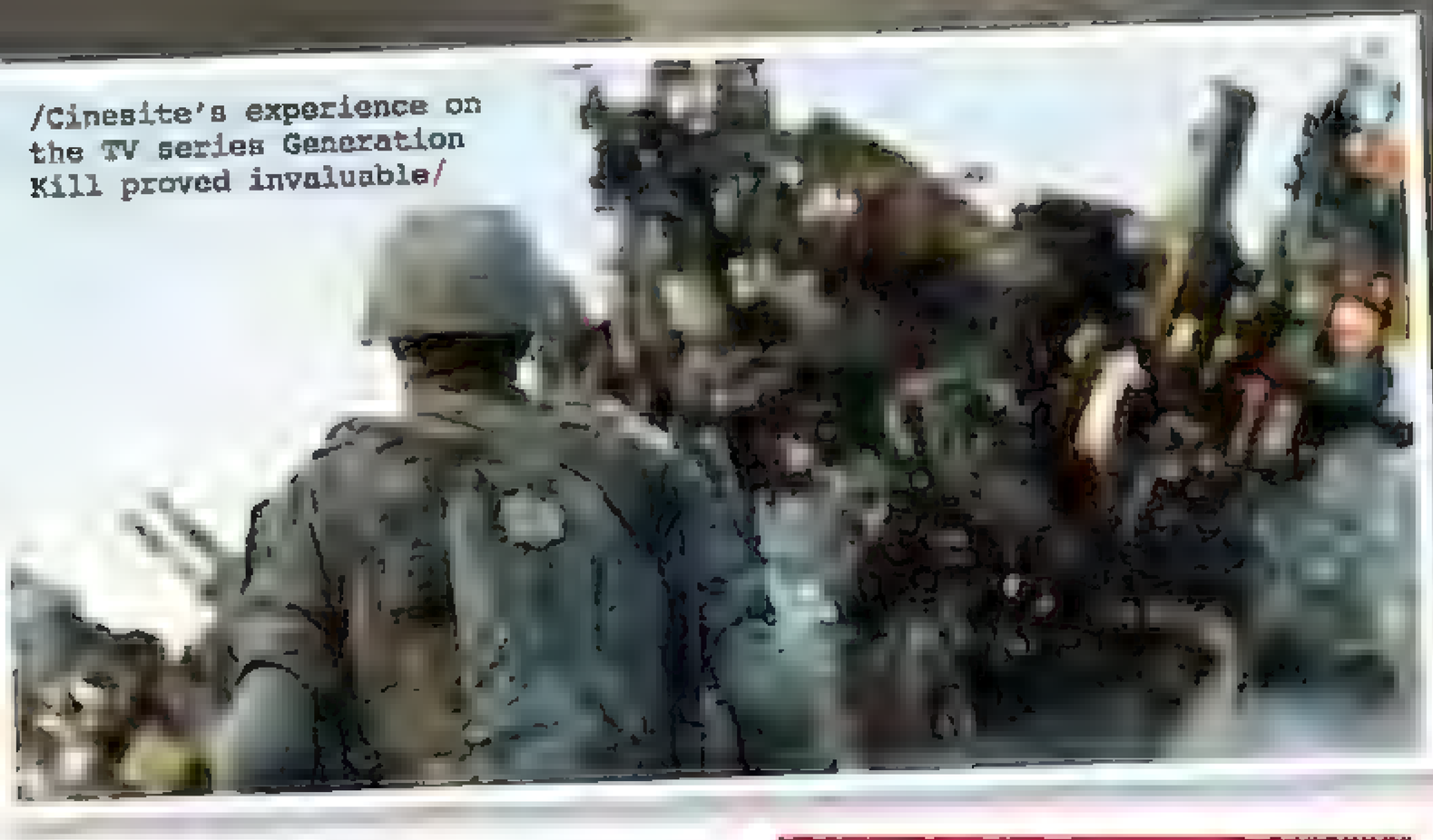
	Battle: Los Angeles
	$70 million
	Approx 22 months (March 2009 – Jan 2011)
	Approx 1,000
	Cinesite, SPIN VFX, Hydraulx, Shade VFX, Matte World Digital, Intelligent Creatures, AXIS vfx, Luma Pictures, The Embassy, Soho VFX, MPC
	112 minutes

Just imagine it: your military career is about to come to an end when, mere days before your long-awa ted retirement, hostile alien forces invade the world. Talk about bad luck. Jnfortunately for Sgt Nantz (Aaron Eckhart), that's exactly what happens in the new movie Battle: Los Angeles.

The original idea for the film was based on events that occurred in 1942, when an unidentified aircraft hovered ominously over LA. The uncerta nty surrounding the mystery object has left it open to much specu ation over the years. In this version, the enemy is aliens – lots of them.

With the city of Los Angeles not keen on hosting huge pyrotechnics, director Jonathan Liebesman and the Battle: Los Angeles crew travelled to Baton Rouge, Louisiana to shoot the live action and get a bargain on their explosives. That left room within the relatively modest $70 million budget for plenty of CG work the film features approximately a thousand CG shots, many full of complicated visual effects. »

/Huge 3D environments were created by the SPIN VFX crew using predominantly Maya and Nuke, with help from Flame/



/Cinesite's experience on the TV series Generation Kill proved invaluable/

Reuse and recycle

After being noticed for its impressive work on the TV series Generation Kill, VFX house Cinesite was awarded 100 shots. With a crew of 32 and a 10-month deadline, the workload pushed production to its limit. Like the movie itself, the workflow was somewhat unconventional. "It had to be simple, quick and efficient – different from other pipelines," says Cinesite's VFX supervisor Ben Shepherd. "This was more of a commando operation."

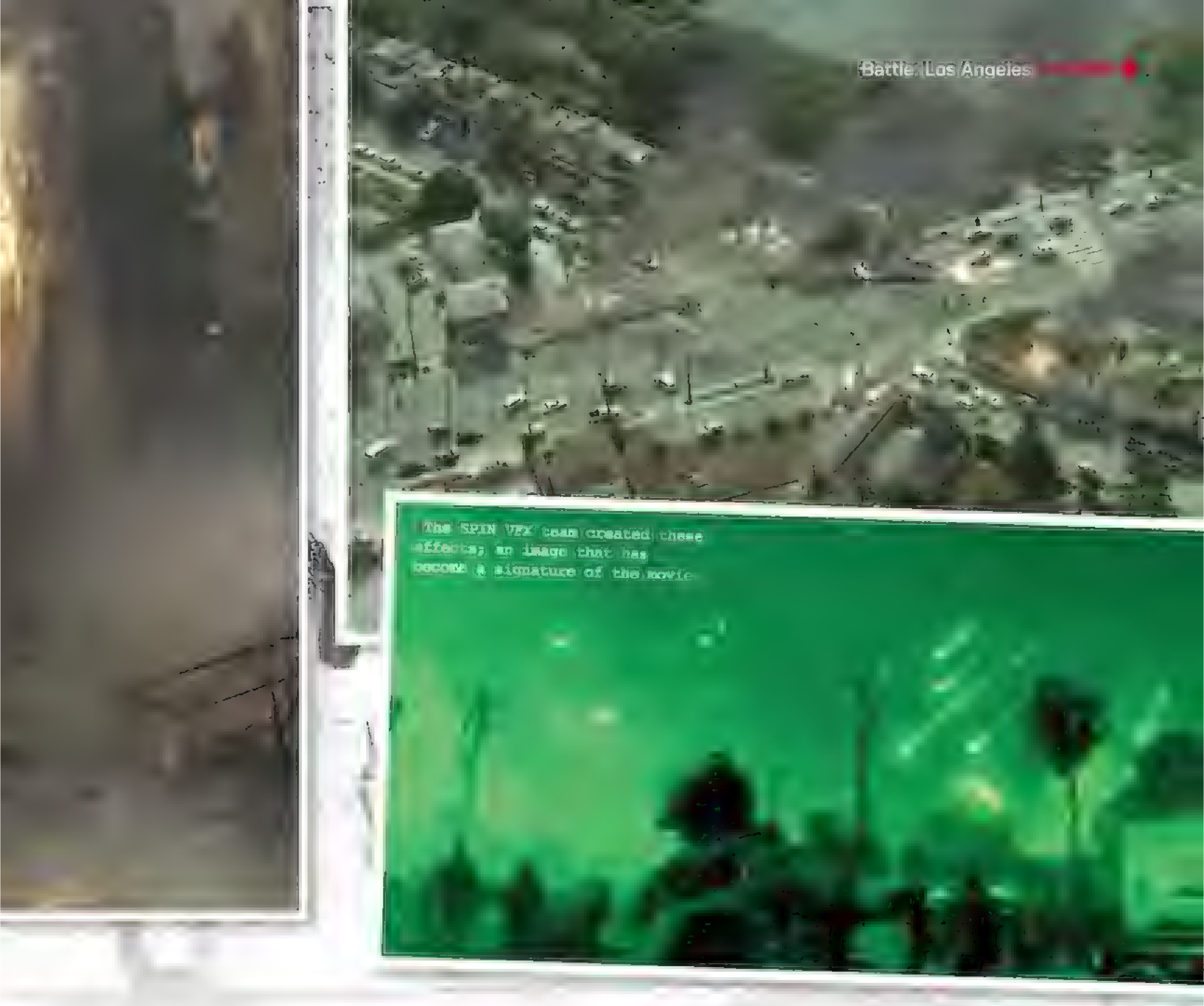
Collaborating with other facilities, Cinesite had to be able to incorporate outside assets into its pipeline as well as dealing with new tools in production. The film was the first show for which they adopted the compositing program Nuke, after saying goodbye to Apple's workhorse, the now-discontinued Shake. "Nuke is much more powerful than Shake in terms of processing speeds: instant feedback on building shots and reviewing flipbooks," says 2D supervisor David Sewell. "In terms of functionality, it was pretty invaluable. A lot of the larger establishing shots on Battle: Los Angeles were built within the 3D environment in Nuke, using projections with between 30 and 50 layers of elements."

Maya was used for animation and combined with Mudbox for the modelling of assets, with RenderMan and Cinesite's proprietary in-house shader tools used for rendering. Having already worked on a military-themed show, the Cinesite team had the benefit of owning models that could be repurposed for the film although making subtle adjustments to existing machinery wasn't quite as straightforward as it should have been. "You would think that a show we did two years ago would have easily fit into our pipeline, but it didn't," says Shepherd. "We could have modelled new assets in the time we spent trying to convert them." Replacing helicopter rotor blades with CG versions to avoid rotoscoping was one of the small but necessary jobs that added to the workload.

As well as recycling old models, Cinesite created new ones, adopting a common-sense approach to their formation. Working from the lens backwards is a method that Shepherd champions: "By figuring out the most important parts first, you can put all of your efforts into them and make sure they work brilliantly. You don't want to spend two weeks texturing an alien's armpit that you're never going to see."

The development of the alien hovercraft model is a perfect example of this process in action. The team was aware early on of its rough scale and how often it would feature in the film. They used this information to create a base mesh with a fairly low

//"I remember having to go and get someone from another show and ask them to look at the shots for me because I couldn't work out if they just looked idiotic or fantastic"//
Ben Shepherd, VFX supervisor, Cinesite



resolution then focused on detailed texturing to achieve the final look. "It was a question of production efficiency," Shepherd explains. "It's not the most detailed model, but once it was textured with bullet hits, smoke and dust, it looked the bomb."

Many of the CG assets were created in the same way to increase productivity. Alien character designs had been specified early on by the director, who wanted them to have a biomechanical feel and be unlike anything ever seen before. The enemy had to visually represent a stronger opponent than the US military but have a natural structure that could eventually be destroyed. VFX house Hydraulx built the infantry alien and passed it on to Cinesite, which used it to construct more complex characters, as well as a command centre antenna that plays an important role in the film.

Early concepts for these models were rough, so the artists were able to add their own designs as they modelled. Dan Mason, one of Cinesite's model and texture artists explains: "The antenna is made up of two main components, an organic core and a mechanical exterior. It was modelled as such to reflect the design of the main alien creature, which relies on a robotic exo-skeleton to move around. The size and shape of the model was designed to look as menacing as possible, with lots of sharp edges."

The team modelled in sections, keeping meshes as low-density as possible to make them easier to destroy and keep render times down. The high-quality textures were completed using a combination of Photoshop and Mudbox, in which displacement and various other maps were painted directly onto models. To animate the characters, Cinesite mixed an extensive mot on-capture library with keyframe animation, adding fine detail and specific glitches in their movement to achieve the correct look.

Many of Battle: LA's aliens feature in locales that are heavily extended CG environments, such as tunnels and sewers. Shooting live-action material underground meant the crew had to achieve complicated effects in difficult working conditions. "It was a horrible set to work on," says Shepherd. "The camera lenses, the chrome ball [for HDR] The whole set would steam up."

Despite this, the extensions had to achieve a sense of scale yet maintain continuity with the claustrophobic set. To accomplish this, they were built specifically narrow in width but broad in depth and height: this kept the cramped feeling in one axis but allowed for a potentially large volume in another. By placing characters just beyond the visible depth, the sets helped to create an air of unease over what may lurk deep in the shadows.

Cinesite lighting artist Graham Houston played a key role in many of the sequences that feature extended environments: "In one particular shot where the marines have reached a [fully CG] chamber that connects to the street level, it became necessary to use VFX to visually illustrate their goal. I ended up utilizing some raymarching techniques to get sun rays poking down through surface grates. Around the middle of the shot, something up top walks over a grate and blocks the light casting down for just an instant. It's a great moment."

War on the streets

The extended sets are by no means the only CG-heavy scenes. As the war spills into the streets of LA, so do the many intricate effects that accompany it. Like any director, Jonathan Liebesman was specific about the look of each shot, and was particularly difficult to please when it came to one that featured a destroyed forward operating base.

To portray the scale of destruction, Liebesman wanted it to merge into the horizon, a shot that required a difficult camera move extension. The team worked tirelessly to perfect it until finally the shot was approved. It was then simply a case of adding CG elements such as fire and military vehicles, before combining them with a 2.5D matte painting and lots of smoke to achieve the final composition. »

/The director challenged the effects artists to produce smoke that wasn't recognisably CG/

When director Jonathan Liebesman saw this frame, he said: "That's my movie!"

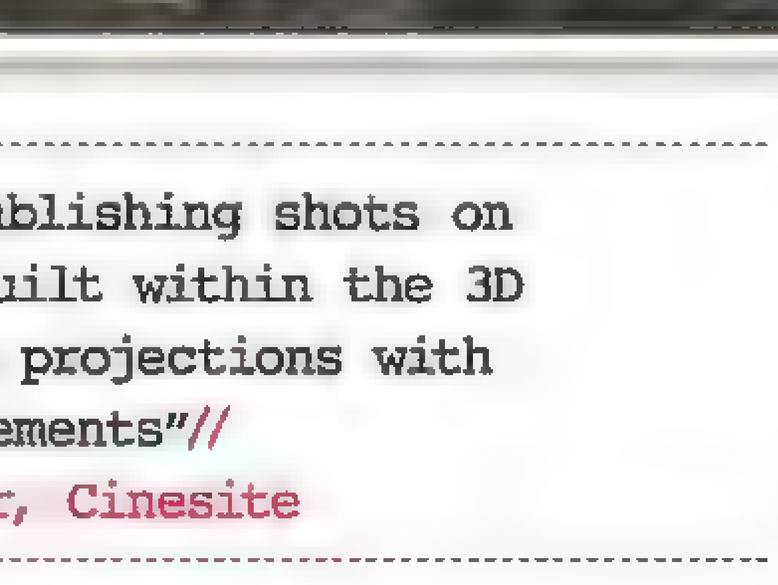
//"A lot of the larger establishing shots on Battle: Los Angeles were built within the 3D environment in Nuke, using projections with between 30–50 layers of elements"//
David Sewell, 2D supervisor, Cinesite

One of the most common effects in the movie is smoke; in fact it features so much that the director set a challenge early on, claiming he would be able to spot any CG version if it wasn't executed well enough. Cinesite rose to the challenge and was responsible for the huge smoke rings that have now become a signature image of the movie. They form a fundamental part of the film's opening attack, with Liebesman wanting them to act as a retro-thruster mechanism that would slow the alien meteors down before landing.

The complex effect was created by Claire Pegoner, an FX TD at Cinesite, who efficiently divided the task into two main sections using Maya Fluids. First, an initial burst was needed to start the explosion and was achieved by using particles to quickly emit fluids and replicate a blast effect. The second part of the process was to produce rolling smoke. "For this, fluid was emitted from a torus surface, and driven by a torus volume Axis Field to force the fluid to rotate around itself," says Pegoner. "To give the rings an irregular and natural look, an expression was applied to the fluid emitter, and the force acted upon it to vary them both in space and time."

In an attempt to reduce production times, seven variations of the smoke ring were created. With Maya Fluids now multi-threaded, it meant the simulations could be put on to a render farm. The particular look that the director was after meant a case of trial and error for the Cinesite team. "The real tricky part was varying the thickness of the seven versions," explains Pegoner. "It meant that the ring radius had to be correlated to its corresponding ring section: a too-small radius or a too-big section would break the set-up and create blurry, collapsed rings."

The development of such particle systems can be a lengthy and frustrating process. To help things along, shading and render artist Michael Wortmann (now at Weta Digital) wrote a 3D proprietary renderer, which gave the impression of adding up to 10 times the amount of resolution to the rendered simulations, as well as the ability to calculate how much detail was needed depending on its distance from the camera. This meant that extreme close-ups of the smoke rings could be made without losing any detail.

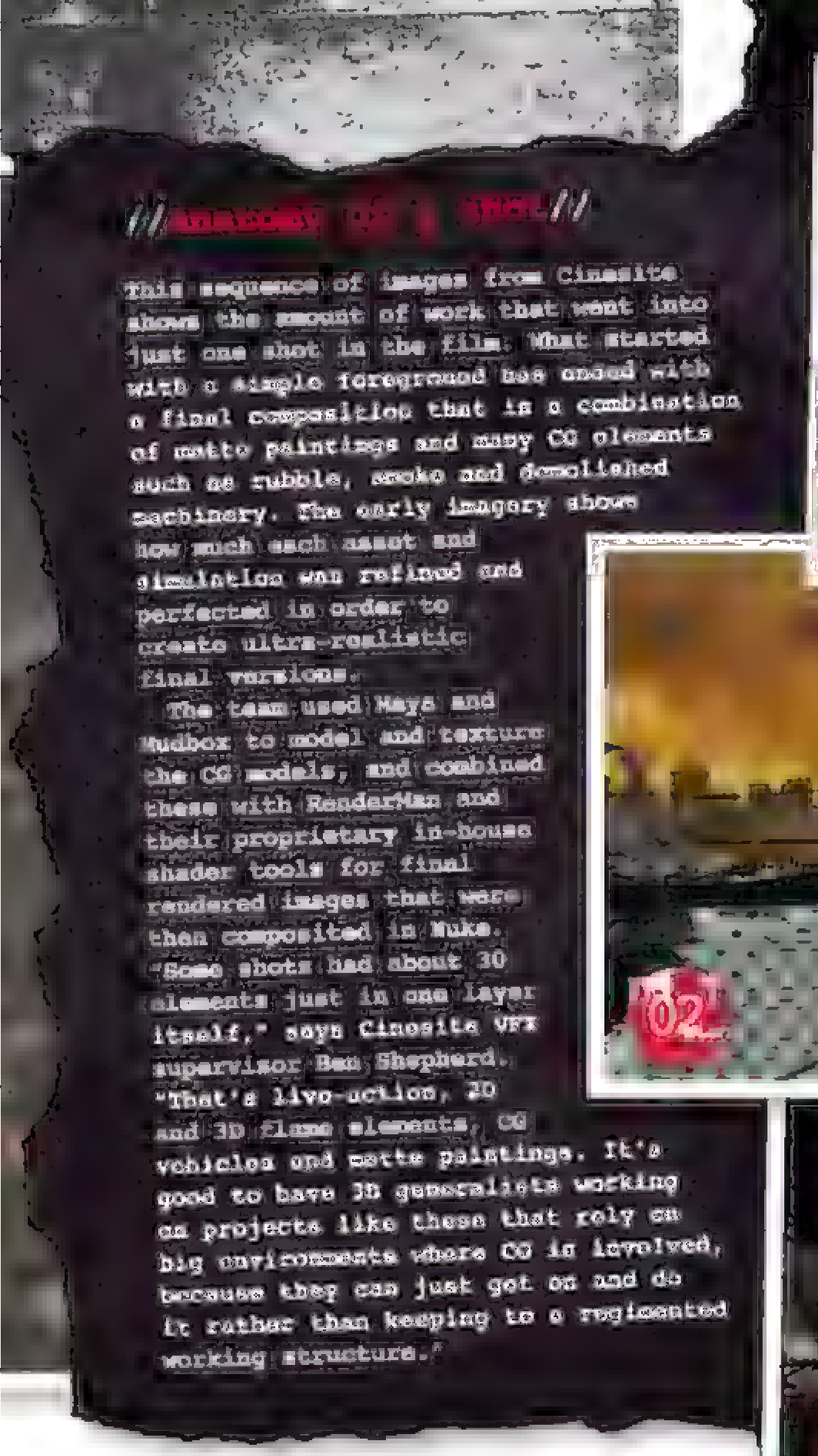


/The handheld nature of the film footage meant that the effects artists had to deal with complicated camera tracking on many shots/

Documentary style

As well as dealing with individual elements in a shot, Cinesite had to work within the movie's overall style: a documentary that follows a team of marines from a first-person perspective. Its loose, handheld camera shots provide a refreshing change to the generic dolly shots that normally emanate out of Hollywood – but they caused huge challenges for the VFX facilities.

Scenes requiring camera tracking and match-moves that would normally be simple to solve became problematic: even though the camera wasn't moving much, the nature of the shot and the director's love of crash-zooming made them more complicated. Cinesite used whichever software program worked best for each particular scene; although it stuck predominantly to 3D-Equalizer,



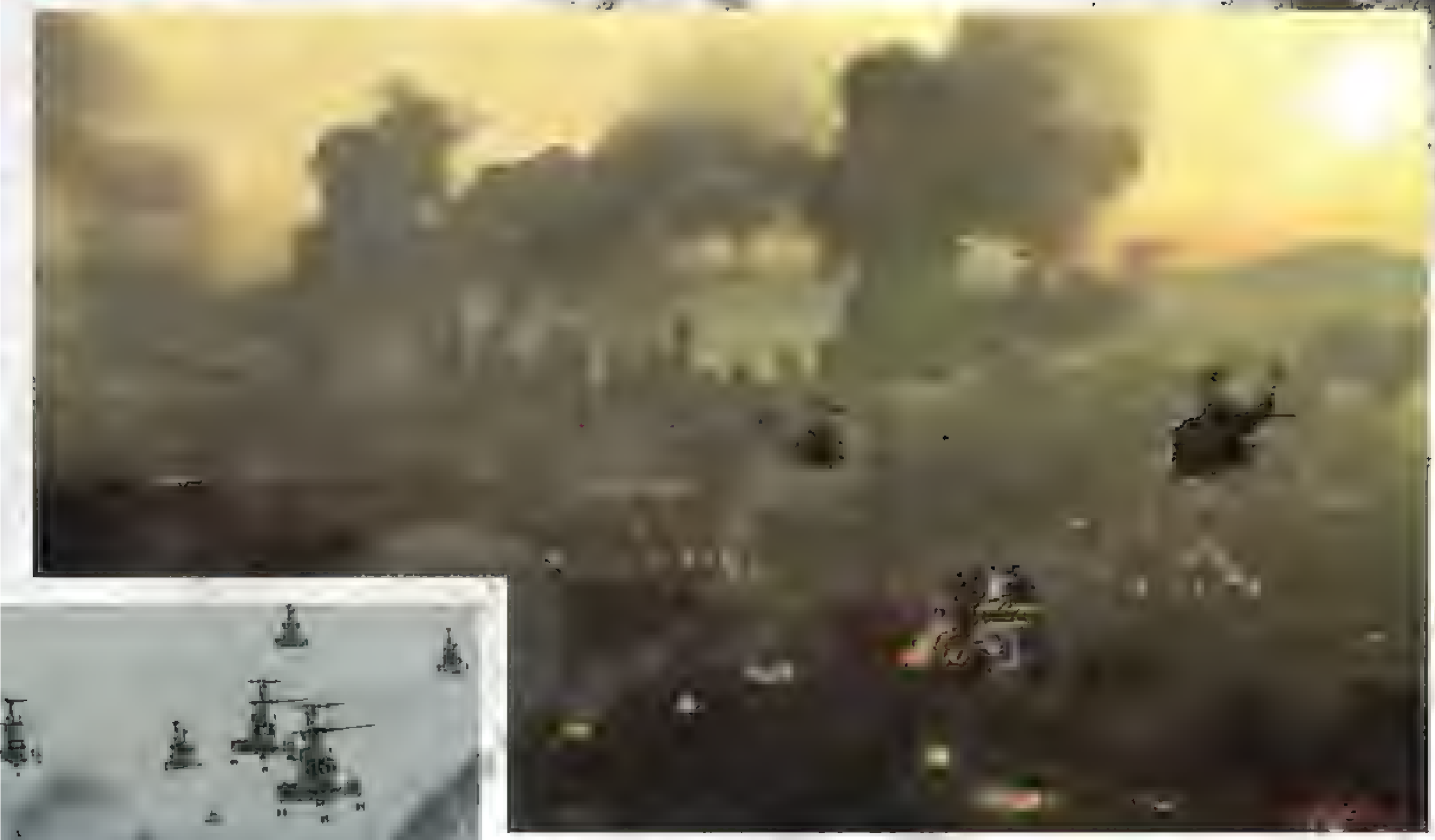
everything from PFTrack to boujou was used at some point during production

Also trying to deal with the handheld nature of the film was SPIN VFX, another facility based in Toronto. The unsteady movement of the camera meant the team had to handle lots of motion blur, which added more work to the nightmare of tracking. Using a combination of techniques – including good old-fashioned guesswork – the studio relied heavily on RenderMan. "It enabled us to replicate natural motion blur," says VFX supervisor Jeff Campbell. "It handles displacement beautifully, and render times are incredibly fast and efficient"

This was far from the only hurdle the facility faced in the 200 shots it worked on, which included some of the biggest VFX sequences in the movie. The team worked tirelessly on the project for about five months, delivering 30 sequences that covered environments, characters, detailed models and huge crowd simulations.

One of the more complex models created by SPIN was a sinking battleship that, although seen only for a split-second, took a considerable amount of time to produce. The team used WWII footage as reference which was soft and degraded due to its age, but this actually worked in the studio's favour. The shot required the ship to look similar to the old research material, but it was still modelled in high detail to save time if the brief changed.

SPIN used RealFlow fluid simulations to replicate the ocean. "Our first attempts on the water sims were overkill, as they covered too much of the ship in a huge tidal wave," says Campbell. "We pulled back to make it look like a heaving of the area under the ship from the water displacement from the meteor »





/The Cinesite team often replaced the helicopter blades with CG versions to make them easier to composite/



/Smoke rings were created using a combination of Maya fluids and Cinesite's 3D proprietary renderer/



/Believe it or not, there is only one piece of physical military machinery in this image/

impact". Smaller fluid simulations were then created and used to wash over the deck and hull, before being imported into Nuke to form the final composition.

Just after the alien attack capsizes the ship, the film introduces its first images of the enemy. The aliens appear as silhouetted figures advancing on the beach before they open fire. This is also the first time the alien weaponry is used, a set of technology that required a different kind of research. "The aliens shoot white phosphorus, which is really cool but would require some expensive FX renders," says Campbell. "Once the movie was green-lit, production shot a real phosphorus element library to cover every conceivable angle that may be needed. These elements were full-scale and very beautiful: you can't beat the real thing."

The general public in the film aren't quite so appreciative of the firepower, and instead turn into waves of panicking crowds. The SPIN team used greenscreen projections of people running, which they the projected onto cards in Nuke's 3D environment, as well as using Massive to populate the scenes of them fleeing. It was the facility's first use of Massive, and importing data into their pipeline caused some issues. "It was one of the more difficult tasks, as we did not have much time to test Massive before shot production," says CG supervisor Blair Tennessy. "We did our fair share of trial and error in grooming the simulations to avoid intersections."

/Grand climax/

Nuke's multi-plane card-projection tool was also fully utilised in the spectacular final shot of the movie: a wide CG shot featuring dozens of helicopters and two F18s heading back to a completely demolished Los Angeles. SPIN VFX used an aerial shot of the Hollywood hills showing downtown Los Angeles as a background plate, from which a matte painting was created in Photoshop and imported into Nuke along with the 3D camera track. The studio was given the helicopter asset to develop rigs and write shaders, then a large amount of live-action footage such as fire and smoke was added.

Some of the latter material was prepared in Flame to quicken the process. "Using Flame, I can pull in a shot from tracking and quickly throw a bunch of different elements into it to see what sticks," explains Jeff Campbell. "I can get into trying some crazy shit that we wouldn't have time for otherwise. I really like knowing I have Flame to tackle the most demanding shot challenges."

The decision to add this breathtaking shot was made at the last minute, so the studio opted to hire

//"RenderMan was the most important software enabling us to replicate natural motion blur. It handles displacement beautifully and render times are incredibly fast and efficient"//
Jeff Campbell, VFX supervisor, SPIN VFX

/The hovercraft model was created as a low-resolution mesh, leaving Cinesite artists to concentrate on adding detail through textures /

extra RenderMan l cences to quicken the process. W th ts efficient set up, the extra renders were not a problem for SPIN's pipel ne, which is organ sed n a way that mainta ns consistency but also remains open to change

For Battle. LA, Maya and Nuke were predominant n the pipel ne, although other tools were added and removed along the way. As the pro ject started, the fac ity used Shake, Fus on and Inferno as compositing packages, but as the f lm progressed, Shake was used only for some background automation work, and the other two were dropped from production as the facil ty switched to Nuke as its f rst-choice composit ng package. This kind of organisation requires close monitoring, says Blair Tennessy. "To ma ntain this kind of software anarchy, you must be disciplined, and you must have developers. We have three completely d fferent operating systems, mult ple Linux flavours and a huge matrix of plug ns, bug features and architectures. If you can hack it, it's great because it doesn't b nd your artists to a m ted set of features".

Battle LA's documentary style and breathtaking visual effects take the f lm beyond the s mple good vs evil flick it might have been. Some of the VFX in th s movie could not have been achieved three years ago, wh ch goes a long way to exp a n ng just how complex they are

With a typical shot comprising mu tiple layers and e'ements, the amount of work involved sometimes made the crew find the scale of their ach evement hard to comprehend. "I remember having to go and get someone from another show and ask them to look at the shots for me," says Cines te's Ben Shepherd, "because I couldn't work out if they looked idiotic or just fantast c." ■



TURN OVER:/Build a Battle: LA hovercraft: Cinesite shows us how its done/

BATTLE:LA

The making of the hovercraft

//Anthony Swartout, Cinesite's CG supervisor for Battle: LA, reveals the process and teamwork that made a key element in the film possible//

After our heroes win an infantry attack, the aliens make a last ditch assault using their armoured hovercraft, a two-man attack vehicle with mounted gun turrets. Director Jonathan Liebesman had an overall vision for the alien technology: that it would look well-used and grimy, but still be deadly. So we made the hovercraft look like a really old, battered piece of machinery, which looks like alien technology but has the feel of real military hardware

We were provided with one piece of art by the production's concept artist Paul Gerrard, which showed the vehicle two-dimensionally and from one angle. There were no blueprints, so we continued developing the concept work while modelling. It was a complicated structure, which needed to look and feel like a real machine.

//Modelling//

Paul Murphy, Dan Mason

Paul used Maya for modelling. Although there were several moving sections, there were two key pieces: the base platform that the aliens stand on, and the free-floating gun turret control area that floats over the top of the platform. These two sections are connected by a complicated network of wires and pipes. The model was rigged so that the two main pieces would float independently of each other, ensuring that the wires and jet thrusters could move dynamically

//
The hovercraft was a pretty complicated vehicle to create. It was a complex model and a lot of detail and hard work by the effects team went into it. The idea for the hovercraft came quite late in the visual effects process, but it was one of the most enjoyable things to work on because it had so many complex aspects that brought it to life.

In the final sequence in the film, the hovercraft emerges from the smoke and the mayhem of battle with a real sense of menace; it's very dynamic. People have commented on how cool it looks, and it's something that the whole team is very proud of.
//

The hovercraft emerges from the smoke and the mayhem of battle with a real sense of menace; it's very dynamic//





Rendering

Adam Lucas, Jared Embley

Throughout the sequence, the hovercraft is hit by bullets and is gradually destroyed. We created a destruction user interface, which started with placeholders created during animation and finished with fully rendered destruction textures in the lighting phase.

Lighting

Joel Bodin, Jem Grimshaw, Jean-Paul Rovela

We used a sophisticated in-house shader to light the craft. Also used on the alien, the shader had multiple layers, including several types of metal, oil and dirt. The team began with HDR images taken from the set, which were embellished with other interactive lights and geometry based on Lidar scans of the environment.

Effects

Claire Pegorier, Chas Cash

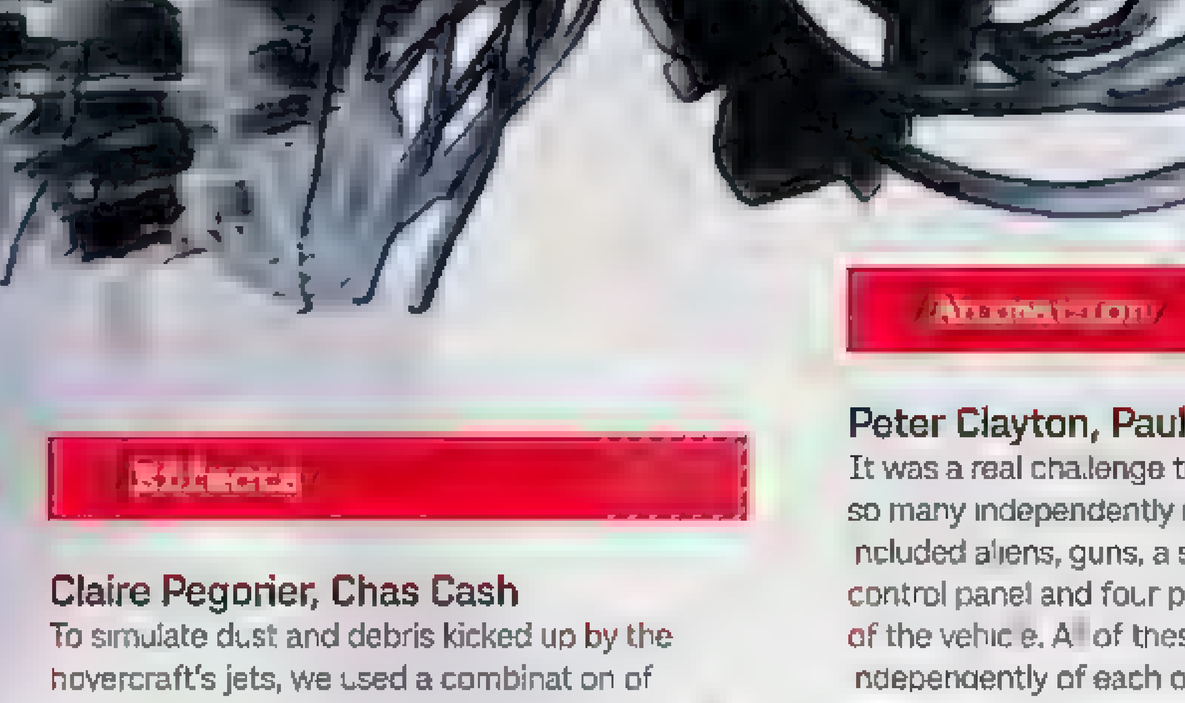
To simulate dust and debris kicked up by the hovercraft's jets, we used a combination of smoke fluids and rigid dynamics. These were all created in Maya by Claire Pegorier and Chas Cash, including a particle effect for the boosters and interactive lighting effects for the flames.

Animation

Peter Clayton, Paul Lee

It was a real challenge to animate a vehicle with so many independently moving sections, which included aliens, guns, a standing platform, a control panel and four propulsion jets at the base of the vehicle. All of these parts needed to move independently of each other, while maintaining a sense of unity and reacting to each other.

The hovercraft's four propulsion jets were all animated separately, to make it appear as though the system is causing the craft to move. It was certainly a challenge to make the aliens look as though they are standing on an unstable platform, while maintaining the sense that this craft is dangerous, sturdy and formidable. ●



Left: Thruster jets, smoke, dust and bullet hits help sell the shot.

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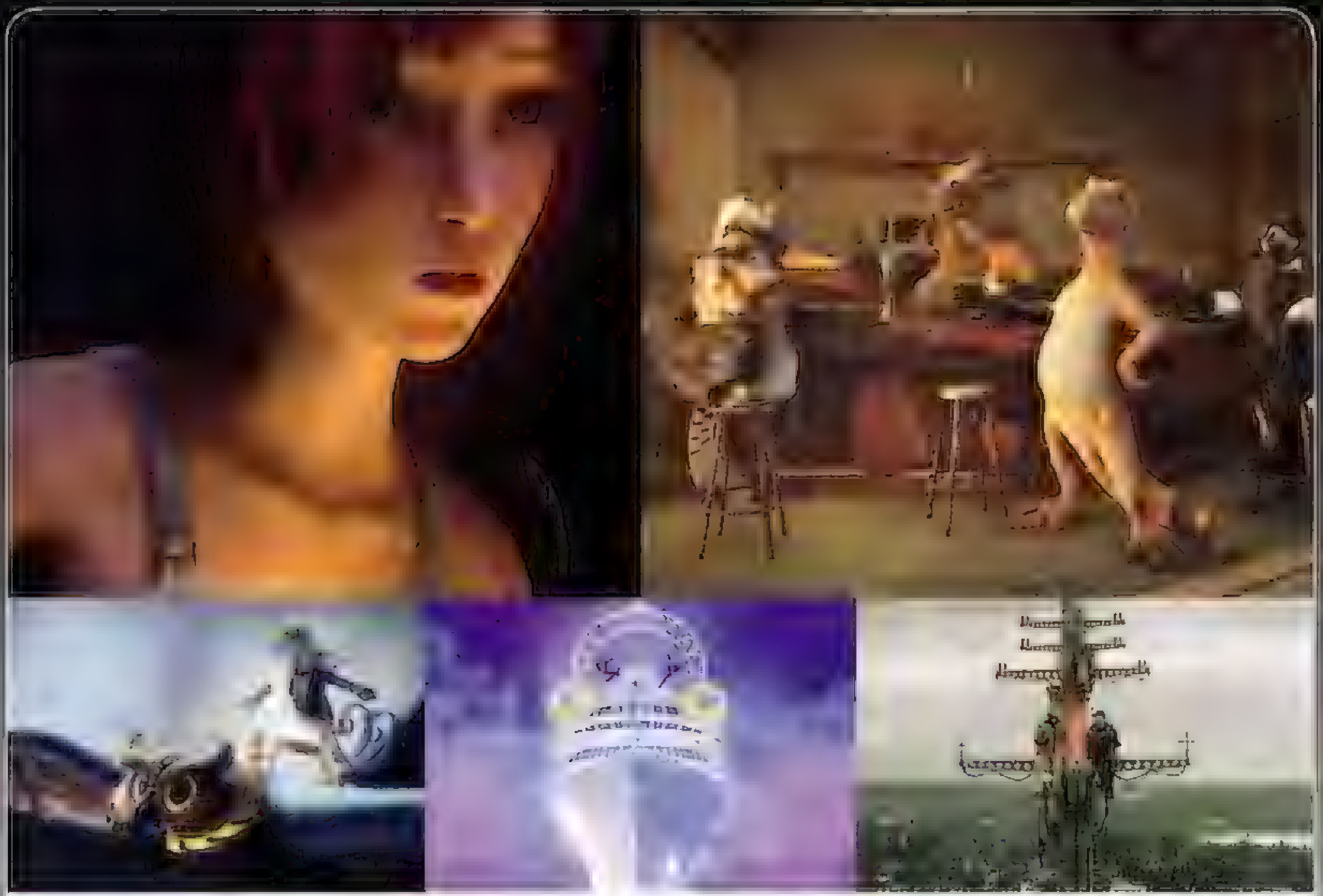
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*Source: Global Animation Industry Strategies, Trends and Opportunities 2009, Animation Age Charts, www.ktopes.com

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Made in Blender (clockwise from top left) The Blender Foundation's 'open movie' Sintel; Red Cartel's animated TV series Kajimba; indie VFX movie Project London; Red Cartel's print illustration work for P&O; and animation for Dutch TV show Klaas Vaak

Blender: secrets of the professionals

Make Blender part of a professional pipeline with this set of workflow tips and tricks from five of its leading artists

Blender may be free, but it isn't just a tool for hobbyists. The powerful open-source 3D package is now used on a variety of professional projects, from the Blender Foundation's own 'open movies' to illustrations, animated commercials and even visual effects work.

While the fundamentals of Blender are well covered by training materials available online, there is little information targeted specifically towards this new group of professional users. So this issue, to help you get the most from your software, we asked five of the world's leading Blender artists to provide their tips for working quicker and smarter under real-world production conditions.

Their tips are presented here in roughly the order they would be used in a real pipeline, beginning with some simple but easily overlooked tricks for modelling and texturing more complex scenes; then moving on to rigging, animation and compositing; plus a couple of tips for asset management on large commercial jobs.

Some of the tricks revealed over the next four pages are simple; others more involved – but they should all shave off vital seconds from repetitive tasks to help you meet deadlines with ease. If you need to examine individual settings in more detail, full-sized versions of the screenshots are provided on the disc. »

THE ARTISTS



handturkeystudios.com



projectlondon.net



redcartel.com.au



reynish.com



cessen.com

01 Don't duplicate: instance instead

You can create and render vastly more complex scenes by using [Alt]+[D] instead of [Shift]+[D] to duplicate an object. The new object will share the same mesh data as the original, reducing memory usage. Even better, any changes made to one object will also be applied to the others, enabling you to update hundreds of objects at once. **IH**

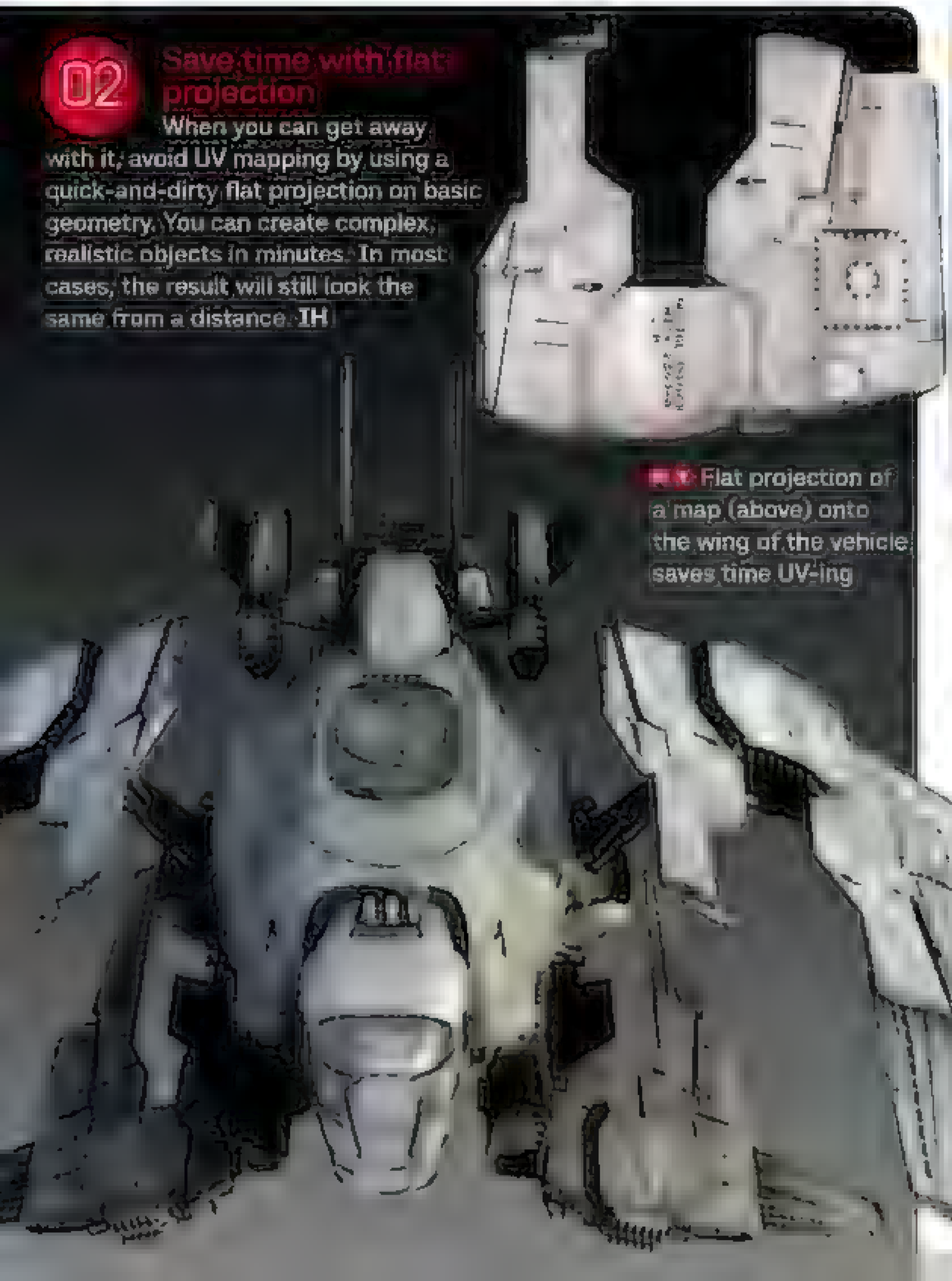




By using [Alt]+[D] to instance objects, any changes made to one propagate to the rest

02 Save time with flat projection

When you can get away with it, avoid UV mapping by using a quick-and-dirty flat projection on basic geometry. You can create complex, realistic objects in minutes. In most cases, the result will still look the same from a distance. **IH**



Flat projection of a map (above) onto the wing of the vehicle saves time UV-ing

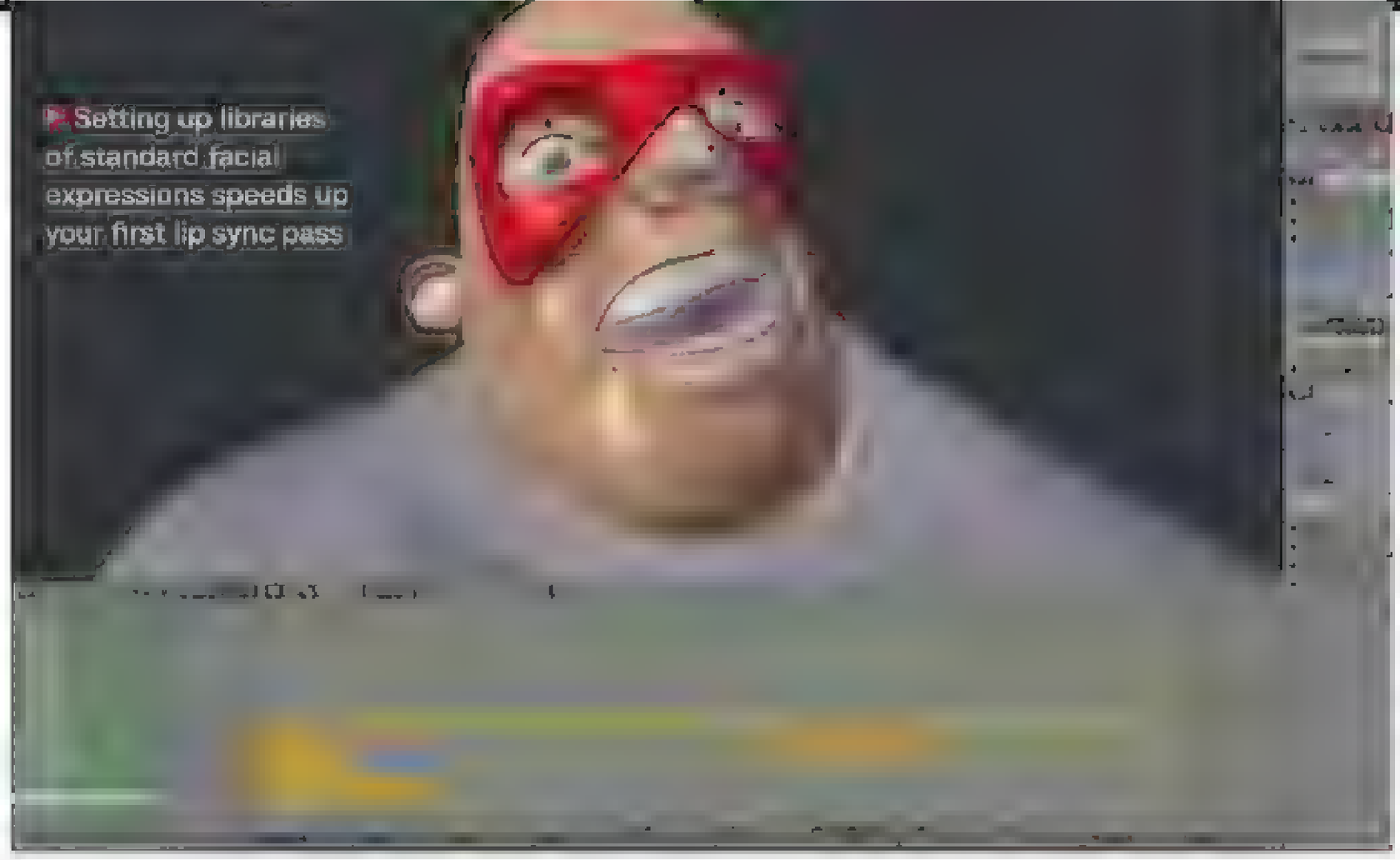


Proportional editing can create an organic feel to a scene, for example when placing plants or rocks

03 Make use of Proportional Edit

Say you have a scene containing hundreds of individual objects: for example, rocks or plant geometry. To position each of them manually would take forever – so to speed up the process, use the Proportional Edit tool. Select a single object and press [O] to turn on Proportional editing. Now press [G], [S] or [R] to respectively move, scale or rotate while simultaneously rolling the mouse wheel. You'll see that all of the objects in the Proportional editing region (shown by a white circle) are affected. The mouse wheel changes the size of the region.

Proportional Edit can be set to many different Falloff types (shown by a rollout near the blue circle Proportional Edit button). Selecting Random will cause random translation, rotation and scaling of objects within the soft-selection region – useful for 'messing up' a scene to make it feel more organic. Since this trick works across all visible scene layers, put any objects that you don't want to affect into a separate layer, then simply turn that layer off. **JN**



04 Use Pose Libraries for blocking

Pose Libraries are a great way to rough in animation, particularly for facial animation and lip sync. This is especially useful if your rig uses bones and drivers rather than exclusively relying on shape keys for phoneme shapes. I like to make a bone group for my lip sync controls and use those controls to create my phonemes. Each phoneme gets saved as a pose in my character's Pose Library ([Shift]+[L]).

When animating, select the bones in the lip sync bone group and press [Ctrl]+[L] to enter a library preview mode. You can then use your mouse's scroll wheel or [Page Up]/[Page Down] to cycle through the poses in your library. Choose your pose and insert your keyframes. This works as your first rough pass on the lip sync to get the timing right. On subsequent passes, you're free to adjust the facial controls to add more personality to your animation. And because a Pose Library is just a special kind of action, you can easily append it to any scene. **JvG**



Now in the Blender 2.5 releases, network rendering is quick and painless to set up

05 Use Network Render to set up an ad hoc renderfarm

Start by switching the render engine from Blender Render to Network Render. On your master node, choose Master from the Network Settings panel of Render Properties. When you click Start Service, you can view the status of the farm by opening a web browser on that machine and pointing it to **http://localhost:8000**. With the master node running, go to the other machines and set them up as slaves. It's the same steps as for the master node: just choose Slave from Network Settings instead of Master. Assuming the machines are on the same network, when you click Start Service, the slave node should automatically find the master. To render, go to the machine you want to render from and set up your client by switching to Network Render and choosing Client from Network Settings. If you click the refresh button, the client should automatically find the master node. Now you can render your animation on your ad hoc farm by clicking the Animation on network button in the Job Settings panel. **JvG**



The Client machine automatically receives the rendered frames from network renders



06 Use Damped Track for eye tracking

Blender's Track To constraint is handy for making objects or bones point at a target. Unfortunately, it is also based on gimbal (or Euler) rotations, which can make it behave oddly. Sometimes that behaviour is what you want (for turrets, for example) – but usually, it's not (on eyes, for example) what you would like is for the object to take the most direct rotation path from its starting rotation to point at the target. Fortunately, Blender has a constraint that does exactly that: it's called Damped Track. In most cases, substituting Damped Track for Track To will give you the result you want. **NV**



Damped Track gives better results than the Track To constraint when animating eyes. Note how the character's eyes now point at the target »

Blender's sculpting tools can be used to control the silhouette of a character over the course of an animation: easy to draw, but hard to do with bones!

07 Use sculpting to fix errors in animation

One of the coolest uses for the sculpt tool was shown to me by animator and teacher Daniel Martinez Lara. Instead of just sculpting static objects, you can use it to tweak the shape of characters as they move over time in order to polish animations. This enables you to fix deformations, add extra stretching or change the outline of a pose – things that are hard to do with bones, but easy to draw.

This only works in the very newest builds of Blender (2.56+). After animation is completed, go to Mesh Properties and locate the Shape Keys panel. Select the Basic key selected from the list and click the plus icon to add a new shape key. Next, move the playhead to a frame you want to tweak, click the pin icon and enter sculpt mode.

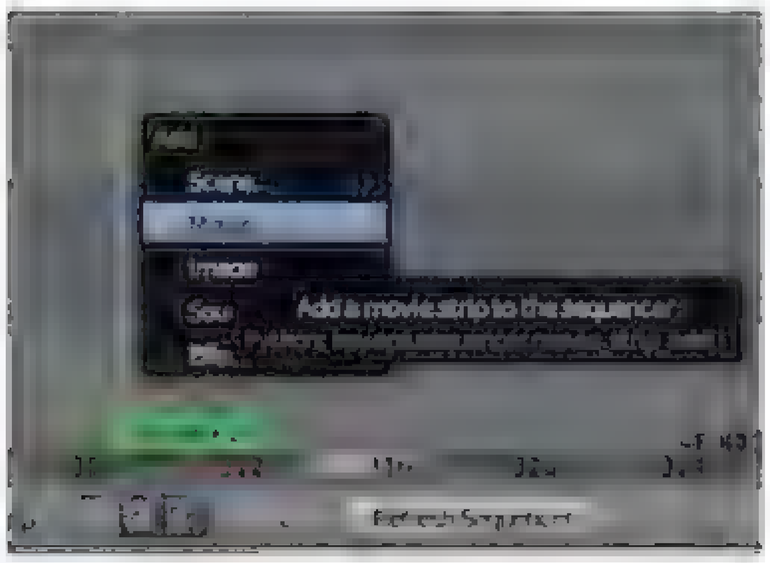
For sculpting, I prefer to use the Grab tool for making larger shape changes, and then the Smooth tool to smooth out problem areas. Once you are happy with your changes, exit sculpt mode and play with the shape Value slider. Hover your cursor over the slider and press the [I] key to insert keyframes to animate the effect in and out over time. **WR**

08 Feed Compositor nodes to the VSE via scene strips

When using Blender for motion graphics, there's some cool handshaking you can do between the Node Editor and Video Sequence Editor. If a shot requires more involved effects than the VSE can provide, switch to the Compositing screen layout and create a new empty scene (I like to name the scene after the shot). Use the Image input node to bring your clip into the Node Editor, adjusting the start and end frames in the node and the scene as necessary

From this point, you can add whatever cool compositing effects you want. When you switch back to the Video Editing screen (it should still be in your editing scene), replace your shot by adding a scene strip in the VSE for your compositing scene

As a bonus, if you delete all of the screen layouts except for Compositing and Video Editing, you can quickly bounce between your composite scene and your editing session using [Ctrl]+[left arrow] and [Ctrl]+[right arrow]. **JvG**



Using scene strips to help work smoothly between the Node Editor and the VSE



Separate your shadows and GI/AO layers within the compositor to adjust their colours

09 Put colour into shadows and global illumination

By default in Blender, shadows and GI are black. This doesn't always give the best result. If you look at Pixar's work, for example, the shadow is usually a darker, more saturated version of the diffuse colour. You can achieve this effect in the compositor by specifying your layer to output a separate GI and shadow pass. Use the Mix node set to multiply your shadow/GI with a colour of choice, then Mix that back into your render pass for best effect. We sometimes render a scene (Scene01) with no GI or shadows at all, and an identical copy of that same scene (Scene02) to get just the GI and shadows layers by themselves. Use the compositor back in Scene01 to composite those layers from Scene02, using the colour picker inside the Mix node set to Multiply or Add to achieve the shadow colour we need. **JN**

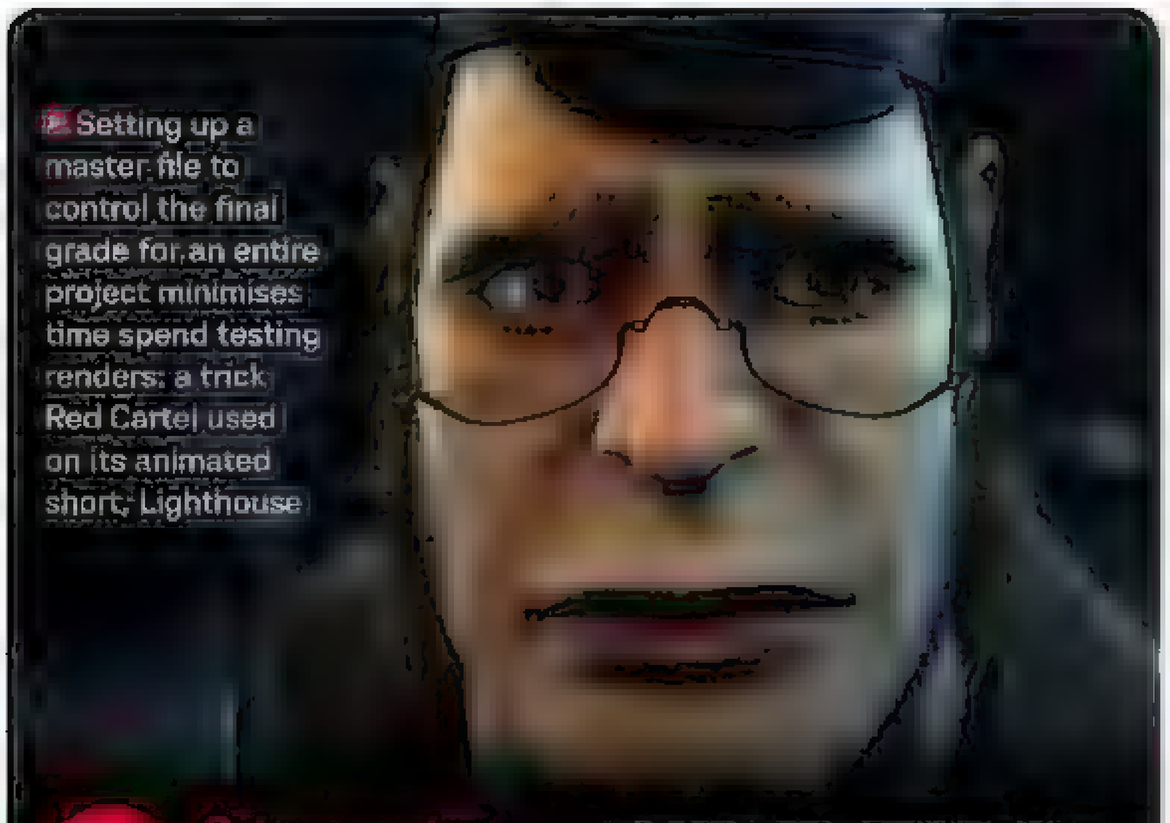
10 Use Only Insert Available when autokeying

Blender, like many 3D applications, has a feature that will automatically insert keyframes when you move an object or bone. Blender calls this feature Auto Keyframing or 'autokey'. I prefer animating this way because it saves on keystrokes, and because otherwise I sometimes forget to key part of a pose I've been working on.

The drawback of using autokey is that it also sets keys on things you aren't intending to animate. For example, if I tweak the position of the camera or lights, and then tweak them again later on at a different frame, this will result in them being animated, even if I don't want it to be. Fortunately, Blender offers a way to solve this: Only Insert Available. With this option toggled on, autokey will only set keys on things that are already animated. The first time you key something, you have to do it manually, but from then on the process is automatic. This lets you treat manual keying as way of telling Blender, "I want this to be animated." From then on, Blender takes care of the rest with autokey. **NV**



Checking the Only Insert Available option means Auto Keyframing only affects scene elements that are already animated



Setting up a master file to control the final grade for an entire project minimises time spend testing renders: a trick Red Cartel used on its animated short, Lighthouse

11 Set up master files to grade large projects

Most large animation projects require you to keep track of many individual shots and grade them consistently at the end. You can use the Blender sequencer and compositor to do this.

First, start an empty .blend file. This will be your master file. Link in every scene you need from the individual .blend shot files and place them in order along the timeline of the sequencer in the master file. (This helps the editor, since the Blender sequencer produces an OpenGL version of each scene, making it easy to see the latest work from each scene in real time.)

You can now set the look and feel for each section of the animation. Select a group of shots that must have the same visual properties, and group those nodes together inside the master file, calling the group 'Master Comp' or something suitably witty. Go to each of the original individual shot files and link back to the Master Comp group.

Now whenever any of the artists updates their work (for example, to update an asset, the animation, lighting, or scene-specific compositing) they only have to tell the person in charge of the master file to reload their particular scene, and the same global feel will be preserved. Since the master file controls both the edit and the global composite group (the grade), rendering via that master file enables you to render the entire project with the exact edit decision list and composite gamut required. **JN**

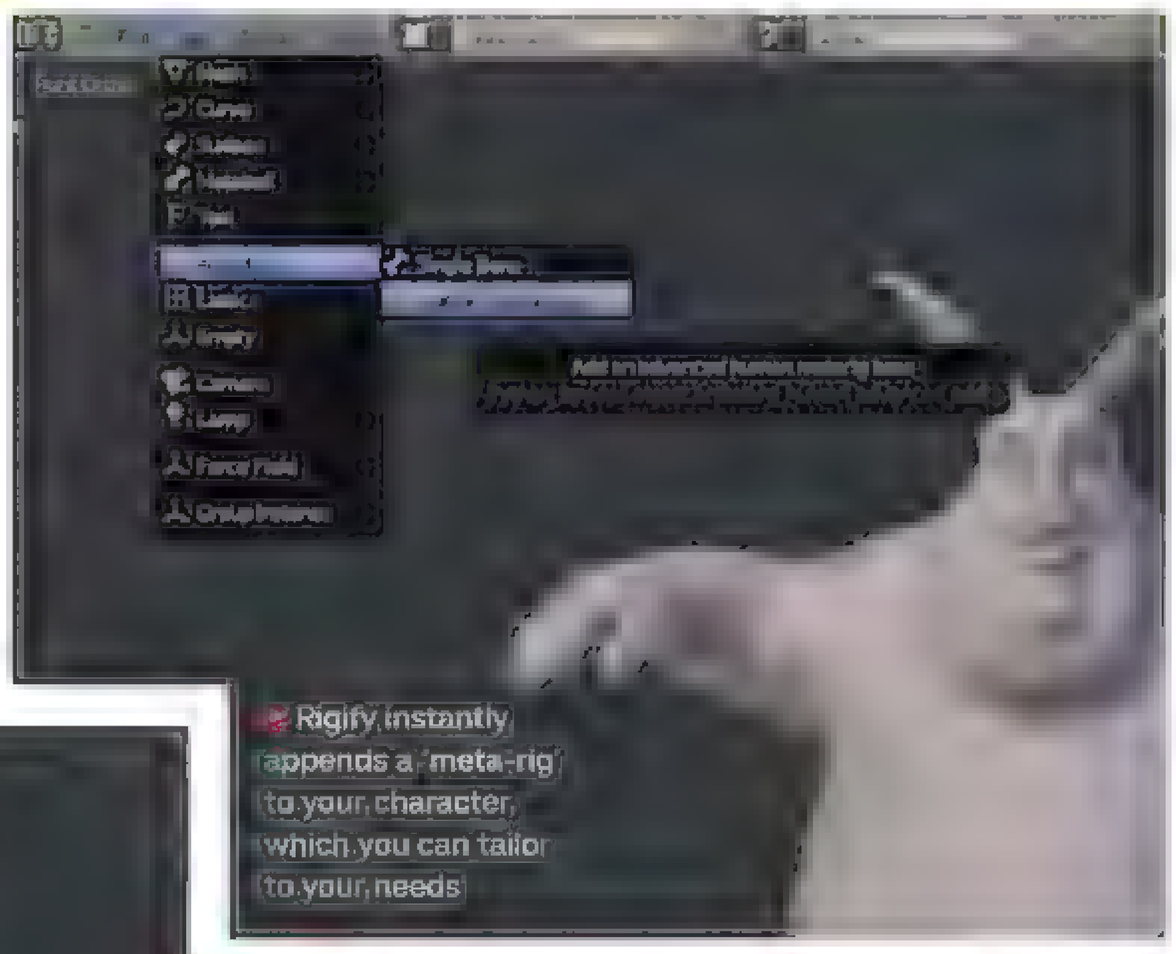
12 Set up Fake users to manage remote collaboration

Red Cartel often collaborates with artists working remotely outside the studio. To keep the pipeline as smooth as possible, we use Blender's excellent library systems.

Data transfer for large scene files takes a long time, so for animators, we ask them to save out their Blender scene with unique names for their character/camera actions. If they then delete all the relevant working geometry and specify their most recent action as having a Fake user (the F button next to that action inside Dopesheet/Action Editor), that datablock is retained inside the empty .blend file. This reduces the file size enormously, making it much quicker to transfer over the internet.

Once uploaded, our local artists simply append or link that data into the latest render scene in order to get the remote artist's updated animation. We use Dropbox (dropbox.com) heavily for this, and since the master edit/composite file refers to the Dropbox folder for each remote artist, all the latest animations are 'automagically' updated in the edit. **JN**

An asset created for in-store merchandising for Southern Comfort. Blender's library systems help keep track of all the different parts during remote collaborations



Rigify instantly appends a 'meta-rig' to your character, which you can tailor to your needs

13 Use Rigify for rapid rigging

Rigify is an incredibly useful tool for getting characters rigged in a jiffy. Instead of spending days setting up a rig by hand, adding constraints, scripts and controllers, it makes the entire process a five-minute affair. Rigify is actually a plug-in, but it's distributed with the latest releases of Blender. (I'm using version 2.56.)

Before you can use it, you need to enable it by selecting File > User Preferences > Add-Ons and locating Rigify in the list. Click the check mark. Next, add the 'meta-rig' (the default initial rig you will use to create your own custom set-up) via Add > Armature > Human (Meta-Rig). Position and scale this to match your character. Enter Edit mode, and tweak the proportions further until all the bones line up with your mesh. Remember to use X-Axis Mirror in the Armature tools panel.

Go back to Object mode, and locate the Rigify Buttons panel in Armature Properties. Click Generate to create your final rig and discard the meta-rig. Parent your mesh to your generated rig and select With Automatic Weights in the popup.

The last (optional) step is to run a UI script to add a nice interface to the rig. Open the Blender Text Editor, and select rig_ui.py from the data list. Press Run Script in the header, and look in the info panel [N] in the 3D view. You'll have a nice list of context-sensitive controls for bones. **WR**



Rigify speeds up the process of creating a character rig, even weighting it automatically

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The 3D mouse began life in the late 1970s at the German Aerospace Research institute for robotics and mechatronics where attempts were being made to control a robot arm in Cartesian space. In 1981, after lengthy experiments, it became clear that a six-axis power/torque sensor integrated into a plastic ball was the ideal solution.

In 1993, a 3D controller was used for the first time on Space Shuttle Columbia, manipulating the first robotic arm in space. That same year, 3Dconnexion was formed; and in 2009, the company launched the SpacePilot PRO, its most sophisticated 3D mouse to date.

3Dconnexion has shipped more than one million 3D mice, supporting over 200 of today's most popular 3D software packages from companies including Autodesk, Dassault Systèmes, Siemens, PTC, Google, Microsoft and Adobe. To mark the occasion, we have four SpacePilot PRO 3D mice, each worth £299, to be won. All you have to do is complete the entry form at our Future Competitions website. Four lucky winners will be chosen at random after the closing date of 1 July 2011



3DConnexion has a long history of creating 3D controllers

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This issue we're giving away four SpacePilot PRO 3D mice, which are each sold for £299.

To enter, simply fill in our online entry form at futurecomps.co.uk/TDW142spacepilot. Four winners will be chosen at random after the closing date, which is 1 July 2011. Terms and conditions apply; these are available at the above website address.

3D Showcase

The month's best new animated 3D projects

Project: Sky 360 **Studio:** MPC

Flames, snow, penguins and spaceships are just a few of the many CG elements in a stereo 3D spot for the Sky Movies TV channel created by the Moving Picture Company. Just under a minute long, it travels through six different worlds. Both the space and ice environments are full CG, while the remaining scenes mix live-action foregrounds, matte-painted backgrounds and CG elements.

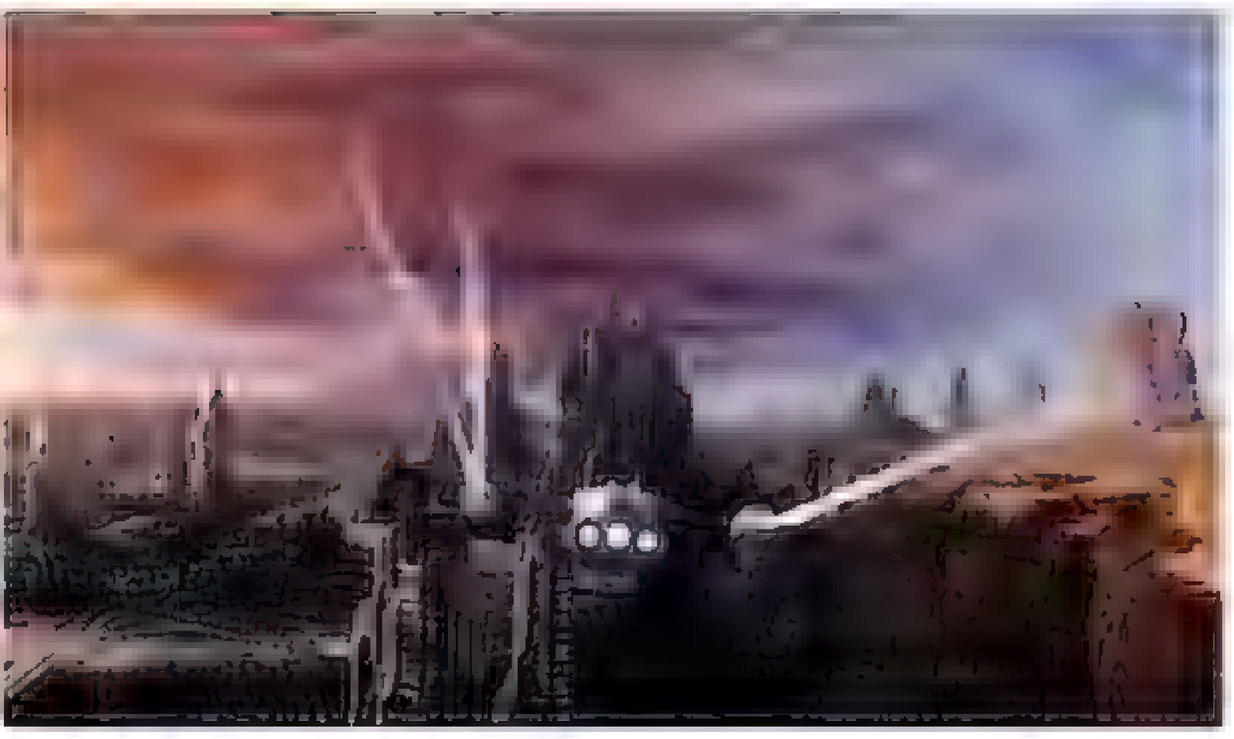
With a team of up to 30, MPC overcame challenging camera tracking in just eight weeks, achieving smooth transitions between each world to give a true epic cinematic experience. "Stereo isn't double the work: it's the work cubed," says Duncan McWilliams, the 3D supervisor on the project. "We're going to see a lot more of it, so it's key to get a good tracking, 3D and compositing pipeline early on. This stuff gets complicated; without due care in the pre-production and filming phases, we would be in trouble in post.

"The management of the job is changing, and pre-viz is becoming important for making decisions before we get on set, when the clock is ticking. The reason this job went so well and looks so great is the skills and attitude of the team."



Projects

Our round-up of commercial work this month includes lots of famous faces, falling angels and the new Mercedes Vito



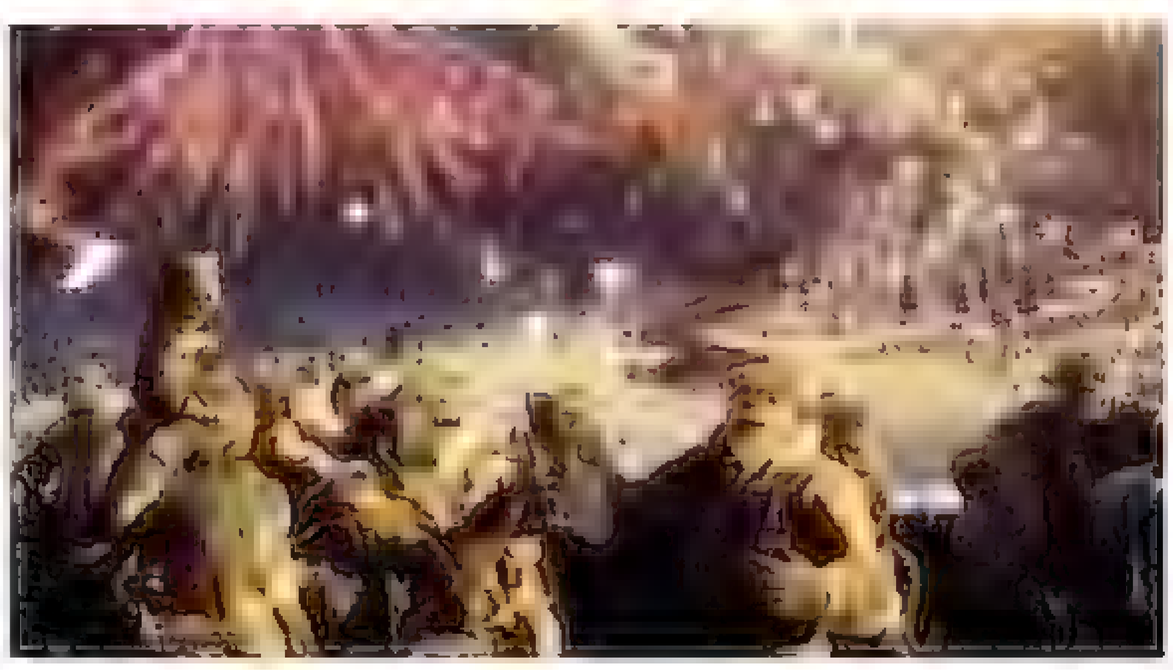












Project: Coca Cola 'Siege'
Studio: Nexus & Framestore

Watched by 85 million people during February's Super Bowl XLV, this fully CG spot was a collaborative effort between production company Nexus and VFX house Framestore in London. The Framestore crew had its work cut out for it, with the short containing just about every form of CG possible: environments, fireworks, crowds and a fire-breathing dragon to mention a few.

The studio's proprietary scripts and tools were used within Maya to develop animation and rigging, taking a team of 10 animators three weeks to complete the job. The CG crowds were time-consuming, as they wanted all the characters to behave differently. To achieve this, the team hired an actor to perform over a hundred different personalities and actions, and recorded them using Framestore's in-house mocap studio. mental ray was chosen as the most suitable and compatible render engine for the overall production. Final composition was achieved through a combination of quick comps in Nuke and adjustments made in matte painting and rendering until the final look was agreed on.

Overall, it proved to be a huge project for the team. "This production was one of Framestore's most ambitious commercials," says VFX supervisor Diarmid Harrison-Murray. "Not only because of the sheer volume of work needed to create the world and action in the film, but also achieving the final visual style. The directors really wanted to achieve the rich detailed painterly feel of this kind of concept or fantasy art, and were keen to avoid creating something that felt too CG."

framestore.com

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Project: VW 'Black Beetle'
The Mill

The VFX job for this fast-paced spot, which was featured during February's Super Bowl XLV, was awarded to The Mill. Directed by DGA winner Dante Ariola, the collaborative effort features a high-speed chase where a small, speed-striped beetle dodges its foes as it races through the woods.

"We really wanted to create believable digital versions of these insects," says lead 3D artist Tom Bussel, "so we needed the help of the Natural History Museum, who have an extensive collection of insects. Hilary Warner, assistant curator at the museum, helped us find the specific insects we needed.

"To create believable CGI for this particular project, we needed to match the lighting of the set very accurately. Using a high-dynamic-range image allowed us to capture all the levels of lighting from the set digitally and light our CGI insect in the same way." The final composition was achieved with a combination of Baselight, Flame and Nuke.



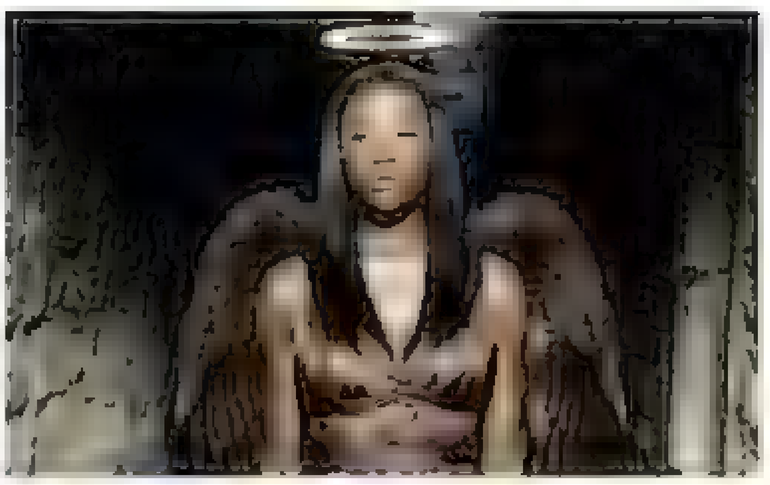




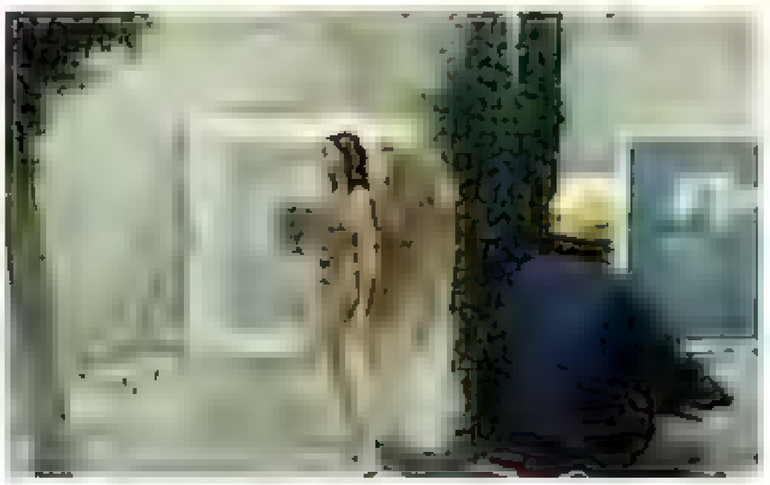












Project: Lynx/Axe 'Even Angels Will Fall'
Studio: The Mill

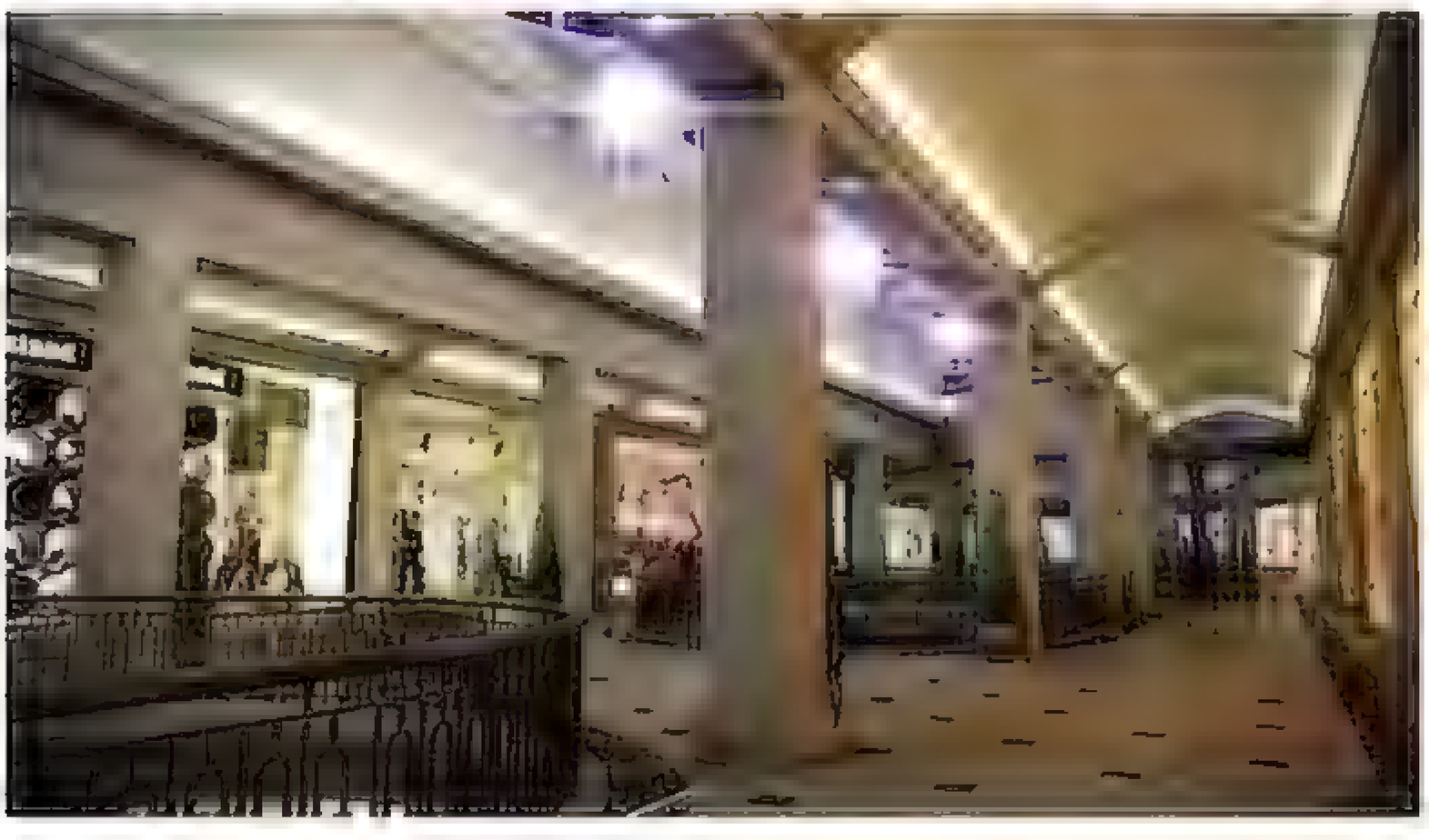
The latest spot in a long-running series for Lynx (the deodorant known as Axe in the US) is another production created by The Mill. 'Even Angels Will Fall' provided several complex challenges for the team, with the main task being the creation of photo-real angel wings in multiple shots and angles. Creating feathers and rigs to allow believable movement and appearance was the most important part to this project: the R&D and 3D departments spent several weeks in collaboration to solve the problem.

Lead 3D artist James Sindle explains: "Aside from the wings themselves, we had to track all the movements of each of the angels, so we had accurate CG doubles to attach and animate the CG wings to. Lots of research went into how these wings were going to look including getting access to the Natural History Museum's ornithology department, in which 98 per cent of the world's species of birds are preserved and stored. This enabled us to design wings that looked the part, yet kept totally true to nature. Once built, the animation was key. The most challenging part was to make the wings appear attached to their owner, but still feel independent, like a duplicate set of arms." The studio used a combination of Maya, Nuke and Flame to achieve the final product









The Colosseum

Uniform

Uniform has just completed this short film to showcase the Colosseum, a 54-hectare commercial development in Bucharest, Romania. The brief was to create an experience that would highlight all aspects of the complex once completed. The studio was responsible for every aspect of this project, from initial concept right through to the final animation.

Due to time constraints, the studio used Photoshop to camera-map the shops inside the mall rather than model them in 3D. Research involved taking photographs of each shop unit, which were then edited in Photoshop to remove unwanted sections. The next step was to colour-grade the images to match that of the film and add in extra assets wherever needed.

"As modeling each shop would have been far too time consuming, we projected our photos back onto the mesh to achieve the level of realism we needed," says senior designer Mark Lee. "We used the Camera Map Per Pixel modifier in 3ds Max to map the shops; this worked brilliantly with our slow, linear camera moves. Once they had the extra 'bling' applied in post, such as depth of field and glares, combined with some reflections re-laid over the top, they bedded into the CG nicely." The final project was completed using V-Ray, Fusion and Premiere.

Project: **Turkish Airlines**
Studio: **Taylor James**

Having recently sponsored Manchester United, Turkish Airlines has taken full advantage of its investment by featuring the team having a kick about in a new spot created by Taylor James. Shooting inside an aircraft would have been a logistical nightmare, so the brief required the studio to replicate it completely in CG and composite the players in later.

Using blueprints as reference, the studio created the environment in 3ds Max. The team worked with photographer Lindsay J Hopkinson to make the exact shots needed to fully integrate the players into the environment. Josh Rogers, Taylor James' retoucher and creative lead, says: "The most crucial part was the day before the players actually came on set, when we were able to have a pre-light shoot. With the CGI models as placeholders, we were able to set everything up to the exact measurements of the plane, ensuring that the POV, lenses and lighting were consistent throughout the shoot."

taylorjames.com





Project: **Mercedes Vito**
Studio: **Happy finish**

Everything but the kitchen sink features in a print and online campaign for the new Mercedes Vito. Taking reference from well-known buildings, the cityscape backdrops create a clever trick of the eye; only on closer inspection do you notice that the O2 Arena, for example, actually is comprised of a colander and some wooden spoons.

Each individual element was made in Maya and modo, before assembling in Photoshop to form the final composition. Lead CGI artist Simon Nankivell comments: "It's been fantastic to work on this project. It proved sometimes challenging to get the balance between the object looking recognisable as the device while representing a building as well. However we feel the final image stays true to the original concept, as well as looking believable. That's the beauty of creating a vision in CGI."

happyfinish.co.uk





Project: Ideas Books 'Autobiographies & Biographies'
Ars Thanea

Marilyn Monroe, Elvis Presley and Andre Agassi are the three stars that bare all in a CG illustration campaign for Ideas Books. Ars Thanea was assigned the job of publicising the wide range of autobiographies and biographies sold by the bookstore. Tapping into an ever-growing celebrity-obsessed culture, the studio decided that featuring the stars wearing only a book cover jacket was the best way to grab people's attention.

With production taking two months, the crew optimised its workforce using four artists: three to model a specific star and one in charge of light and shading. The studio used 3ds Max and ZBrush to model and texture the characters with V-Ray used for the separate passes. Once completed, the images were taken into Photoshop for retouching and post-production.

"This was a really challenging project," says Peter Jaworski, design director and partner of Ars Thanea. "Our team was excited to make it happen flawlessly. Modelling 3D organics is a really tough thing to capture, especialy when your task is to re-create iconic characters such as these. We worked hard to deliver a quality product in the given time frame, and I think we succeeded."





Submit a project

If you would like to see your studio's work featured in these pages, email us at the address below, including brief technical details and at least three print-resolution stills. Please note that we can only feature commercial projects released to the public within the last few months.
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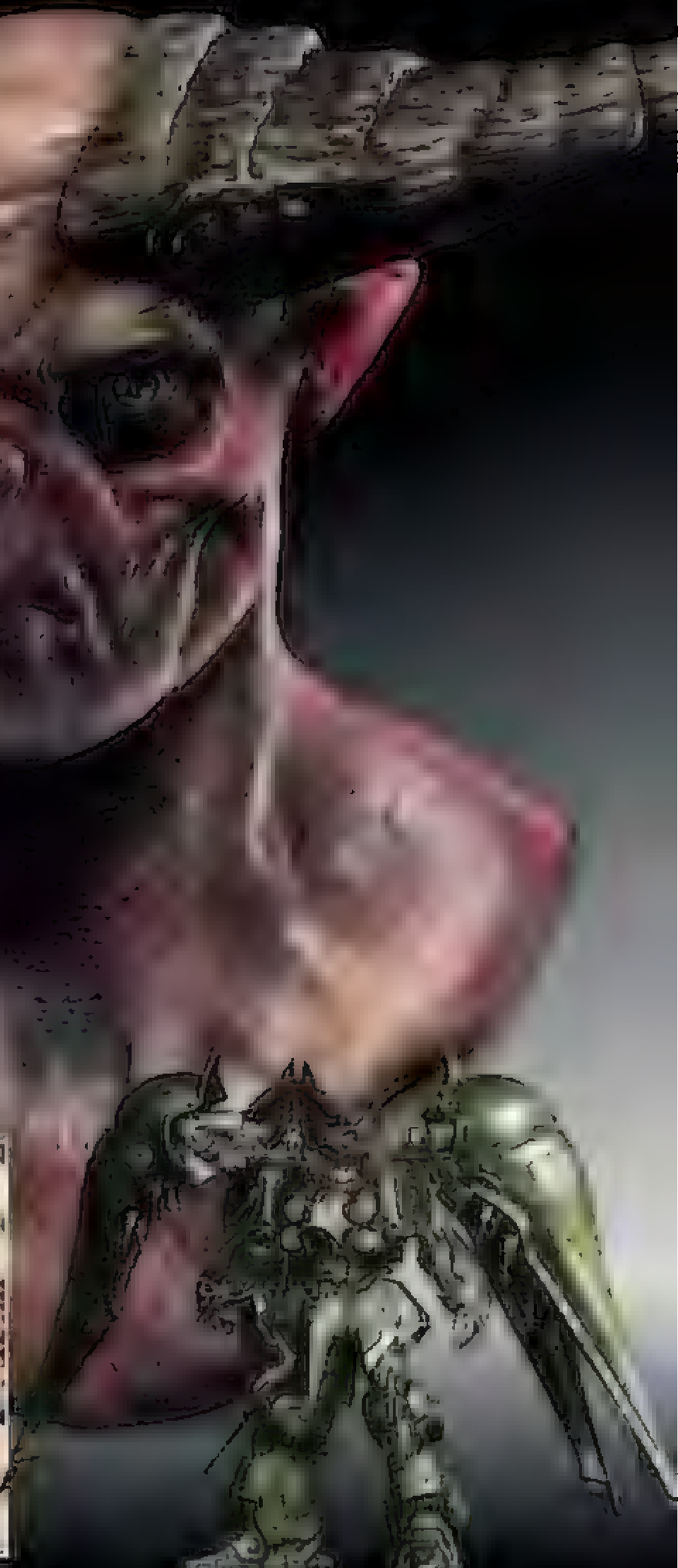
Paint skin textures within ZBrush as Scott Spencer continues his demon bust masterclass

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The making of a masterpiece
We dissect Ioannis Karathomas' stunning fan-art homage to the Gundam universe

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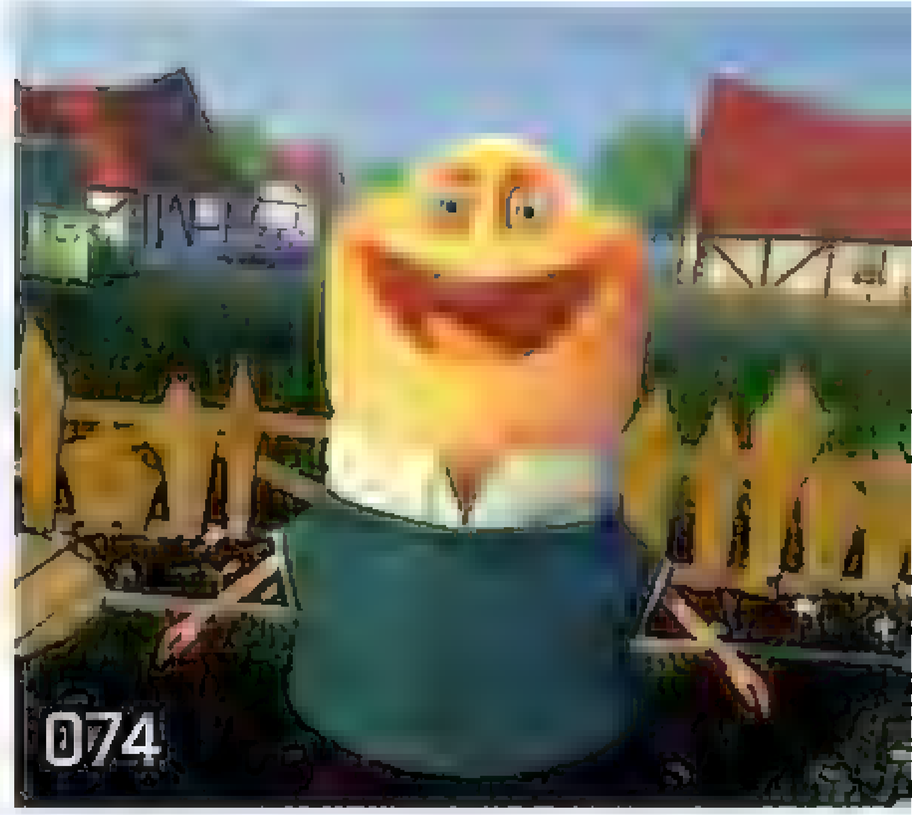
006 Sculpt a creature bust in ZBrush
Weta Workshop's Scott Spencer helps you create a horny devil

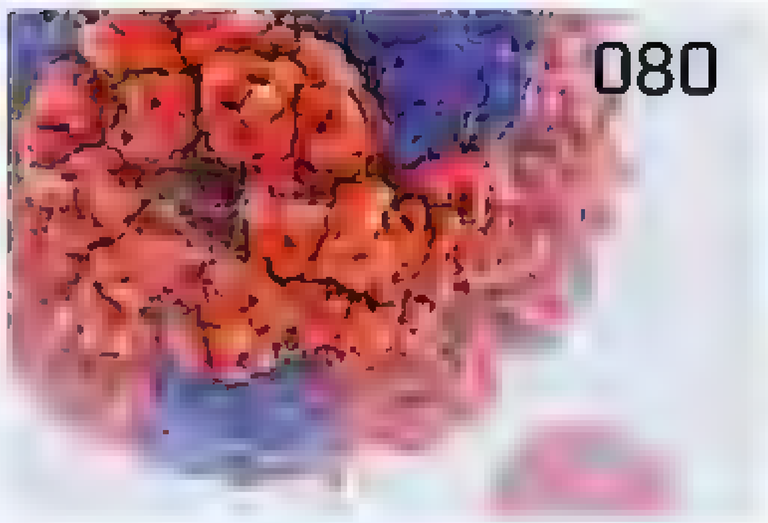
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Mastering ZBrush Sculpture

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Scott Spencer created this bust with ZBrush, using GoZ and Maya to extrude the horns

Sculpt a demonic creature in ZBrush

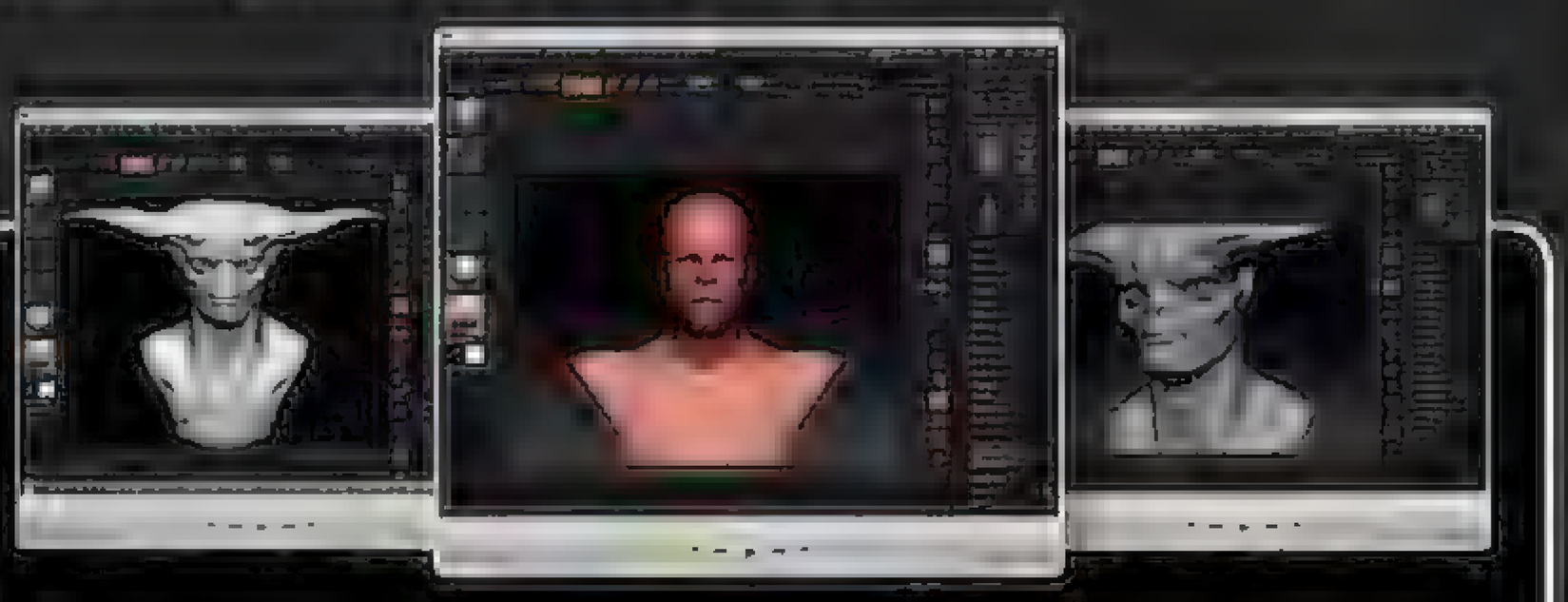
Weta Workshop sculptor Scott Spencer helps you explore form and detailing in your modelling as he shows you how to create a creature from scratch

Welcome to the first of a two-part series on sculpting and painting a demonic character. In this instalment, I will focus on the process of sculpting this creature starting from a generic base mesh. I'll cover how to prepare the model by deleting unwanted faces and creating polygroups to organise areas like the mouth and ears for ease of sculpting.

In addition to these tools and techniques, I'll also look at the thought process behind the sculpture as it develops. It's my hope that by sharing both my technical approach and the design theory I use, it may help inspire some new ideas in how to approach your own ZBrush sculpts.

In this tutorial you'll make use of one of the most exciting enhancements to ZBrush 4: GoZ is a great plug-in that allows you to seamlessly move between ZBrush and another 3D modelling program, such as Maya. This enables you to add entirely new geometry to your ZTool without losing any sculpted details. You'll also use the ClayTubes brush in some new ways to help finish the sculpture, adding a sense of flesh and tendons over the muscular and skeletal anatomy.

I will also talk about the new Topological Mask in ZBrush 4, which makes sculpting and painting into tight areas much easier than previously, and you'll see how you can use the mask pen as a sculpting tool to help in the creation of the rough horn texture. The project files accompanying this tutorial include a fully narrated video of the whole sculpting process, so you can get the most out of these techniques. Let's take a look now at how to sculpt this creature!



WATCH THE VIDEO TUTORIAL

Follow Scott's complete workflow for this project and pick up more great techniques with the video on the 3D World website

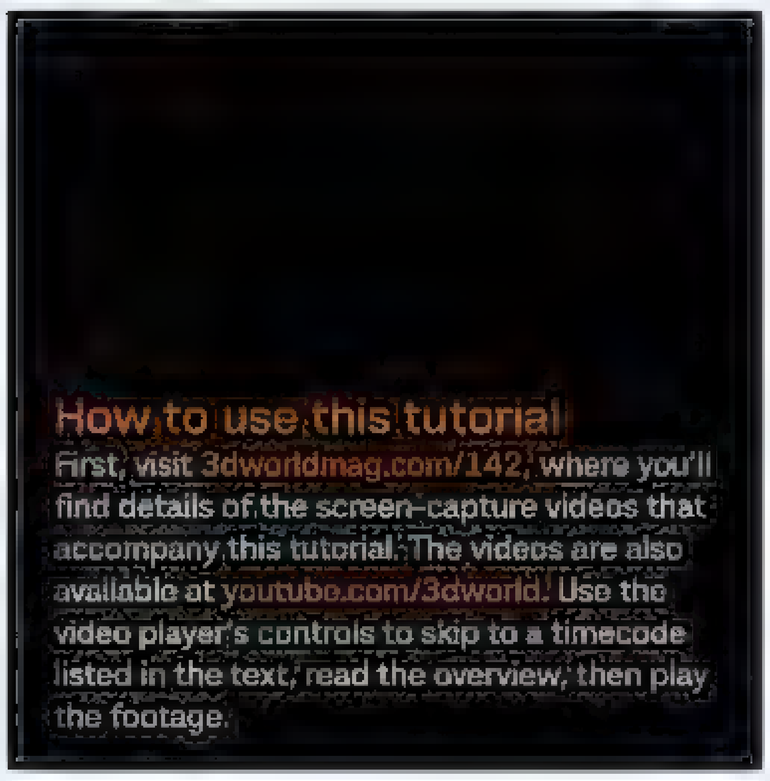
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Video 1
Start your model off by bringing in a generic full-body mesh, then deleting everything apart from the chest, shoulders, neck and head



Video 1
Dividing key parts of the head into polygroups enables you to easily isolate areas so you can work on them without distorting other parts by accident





Stage 1

You'll begin by loading a generic humanoid mesh on which to sculpt this character. ZBrush allows you so much freedom in creating shapes that it's quite possible to create most of your sculptures from a library of a few generic meshes. I have a selection of biped and quadruped models I use as bases for nearly all my work. More specialised forms can be created using ZSpheres or traditional polygon modeling in Maya.

The best base meshes are simply ordered quad meshes with edge loops for the limbs and facial features. Avoid anything too detailed in the base mesh: you will inevitably find yourself fighting the topology rather than sculpting.

If your base model lacks some elements you need for a character – say wings or horns – it's also possible to make changes to the generic model as you work to accommodate new geometry needs. In this tutorial, you'll look at GoZ to add new geometry to a generic head.

In this first section, you'll take a generic human body and slice it into a suitable mesh to sculpt a character bust. We will also look at ways to group the mesh, to allow maximum flexibility when sculpting the model. Taking these initial steps makes the process of sculpting and design run smoother and easier.

Video 1 00:05
Mesh preparation
Begin by loading the generic full-body mesh included in this tutorial's scene files, which is also available for free from Pixologic (**pixologic.com**). I often use this model: it has a nice, ordered topology and is low-resolution enough to allow the maximum number of subdivision levels. The edge flow allows you to use tools like topology masking and polygrouping easily.

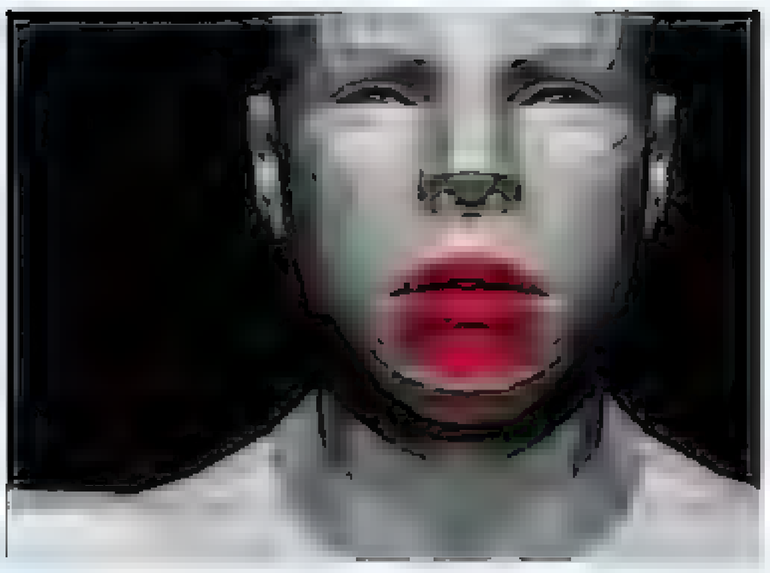
Since you'll be working only on the head, you can remove the body geometry. This enables you to subdivide much higher, because you're not carrying the geometry of the whole body. Remember: each time you divide in ZBrush, you multiply the total poly count by four. You can do this until you reach the memory limit. By removing faces you don't need, you'll get far more subdivision levels.

Select the Brush palette and choose the SelectLasso brush. Press [Control]+[Shift] and draw out a lasso area – it will appear in green. When you release the mouse button, anything outside this area becomes hidden, unless you hold down [Alt], which makes the lasso red and hides whatever is inside the lasso area.

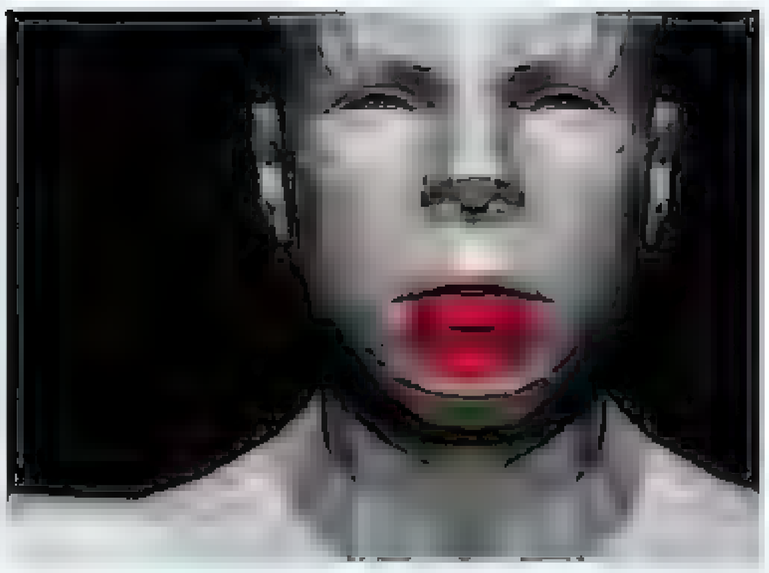
Before you start hiding faces, enable Point Selection Mode via the Transform menu. This allows more exact control of the faces that are hidden: any face that has a point within the lasso will be hidden. Hide all but the faces shown in the top-left screenshot. Delete the hidden faces with Tool > Geometry > Delete Hidden.

This is an ideal spot to end the bust: it's possible to incorporate this into a costume later, giving the impression of a full body. It's also a visually pleasing and elegant place to end a bust, as it gives visual weight and anchoring to the composition of the head and shoulders in an image. The chest and shoulders form a natural pedestal for the design sculpt.

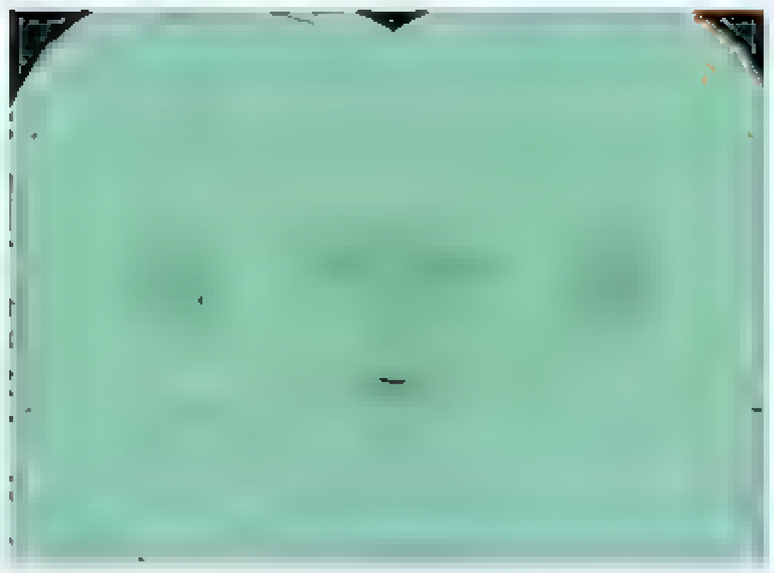
Video 1
Storing morph targets enables you to smooth out areas for easier poly selection as you make groups



Video 1 05:1
In ZBrush, the default range of a brush follows the brush falloff circle at whatever range you set...



Video 1 05:1
With Topological Masking on, the effect is constrained to the underlying mesh topology



Step 1 05:1
The relationship is easier to see in this unfolded mesh: see how far apart the two lips are

Video 1 04:38
Polygroups for sculpting

I often polygroup meshes before I start sculpting. This enables me to easily isolate the different parts of the head as I work. This is especially useful in the ear and mouth areas. ZBrush 4 has a new Topological Masking setting that also helps with these areas; we'll discuss that shortly. I generally find it faster and easier to work with polygroups rather than the brush masking controls.

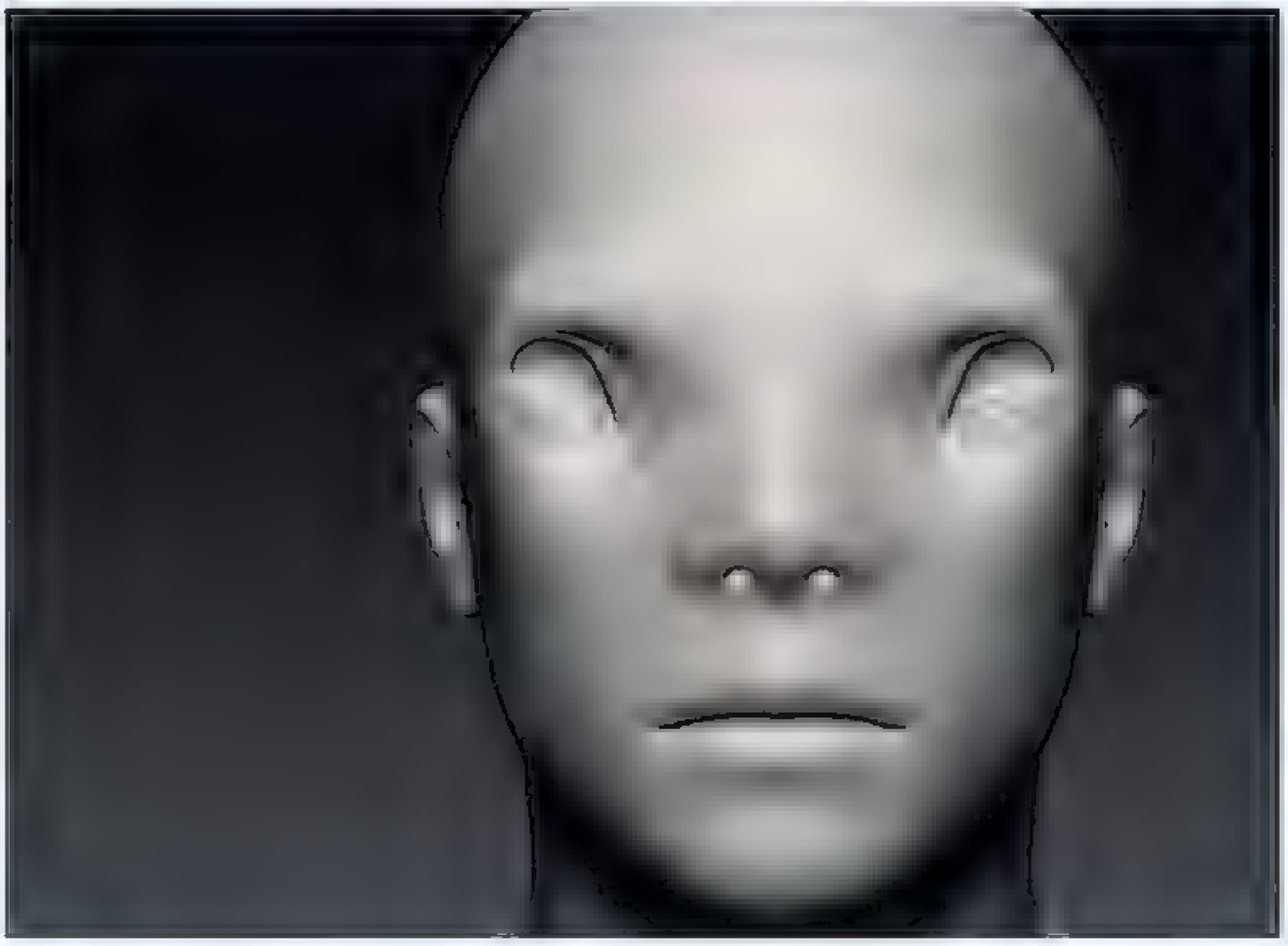
To polygroup the lips separately, first store a morph target via Tool > Morph Target. Now smooth the mouth area until the lips separate and use Select Lasso again to isolate the lower lip. With only the lower lip visible, click Tool > Polygroups > Group Visible. Reveal all again and click Tool > Morph Target > Switch to restore the original shape but retain the polygrouping. As you can see now, you can easily isolate the upper and lower lips.

You will also see on the video that I polygroup the ears. This allows me to easily work on the ear independently of the skull. It can be frustrating when you're trying to move the ears and inadvertently move the head as well.

Video 1 05:17
Topological Masking

New to ZBrush 4 is a brush masking modifier called topological masking. This brush modifier allows you to control the effect of the brush as distributed along the topology of the mesh. This differs from the default brush effect, which occurs under the brush falloff circle. Topological masking occurs under the falloff circle, but is constrained to faces directly connected to those under the centre of the brush.

This effect is adjusted under Brush > Auto Masking. I find a Range value of 0.5 works best for most needs, but it can be a bit tricky to nudge this value in tighter areas to get the best effect. Experimentation will help you find the best value for each application. This brush masking isn't limited to the Move brush: you can apply topological masking to any sculpting or painting brush. This can be helpful when you are trying to detail an ear but preserve the detail of the skin behind it, for example.



Stage 2

Blocking in the design

Now you're ready to start sculpting the character. You know this will be a fantasy demon character, with wide-set eyes and large horns. As you work, try to break the conventions of the human face and make this character a little more animal-like.

You'll begin by shifting the general landmarks of the head outside the normal proportions of the human face. Then you'll quickly dial in skeletal and muscular anatomy. I find it best to work fast where possible: it keeps your work alive and helps prevent you from becoming stuck in one area too long. You can always revisit spots to work on them.

The most important part of this phase is to work quickly and on the whole head at once, trying to pull out a sense of character as quickly as possible. If you have problems working quickly and you are just starting out, it's okay. Speed comes with accuracy and understanding the shapes of the head. Knowing where a muscle or bone goes gives you the confidence to put it in quickly. The only way to reach that point is repetition and practice, so keep trying to work quickly – and keep doing as many character bust sketches as you can. They make great practice!

Video 1 07:12
Break the human facial proportion

The first thing I do with a creature design is to move and rotate the eyes off the normal placement. This is a common way of breaking the humanoid appearance while not becoming so alien you cannot relate to the character. If you look at many of the popular movie creatures on screen today, from Star Trek to 30 Days of Night, you will see this approach is often used. One reason for this is that, for decades, we had only prosthetic makeup to create characters directly on actors (with the exception of animatronic masks). The make-up approach always kept the eyes, mouth and the top of the head anchored in essentially the same spatial relationship. This consistent proportion could never be changed. With the advent of facial tracking, we are now able to make far more striking changes to an actor's face. By altering fundamental proportions like this, you immediately play with the perceptions of the viewer.

Use the Move brush to shift the eyes out. You could also make a change to the medial canthus, or tear duct: by pulling this small anatomical detail down and enlarging it, you can push the eye into a strange physiology while retaining its foundation in reality.

Video 1 07:12
Try to break the head's proportions to introduce animal or alien dimensions to your design

Video 1 09:55
Sketch in the digital clay

Using the ClayTubes brush, rough in the skeletal and muscular anatomy of the face. Try to maintain a gaunt look, with a strong bone structure that includes broad cheekbones and a 'shovel' chin. While sculpting these forms, turn off the alpha on the ClayTubes brush. This enables you to continue to use the brush's distinctive build-up style without the overwhelming noise the alpha generates. »



Video 1
Start to work up the most fundamental forms within a typical face, including the brow and cheekbones

Build up wide, strong cheekbones, and accentuate the lower border of the eye socket: it helps frame the eye in a pleasing way

Next, build up the basic forms of the facial anatomy, like the brow and the barrel of the mouth. Getting these foundational geometric volumes in now will give the head far more dimension and realism as you finish the work. At this stage, you can also lengthen the neck. Increasing the distance between the pit of the neck and the chin helps create a sense of grace or elegance.

Video 4 01:40

Sculpt the lips

To work on the lips, exploit the polygrouping you created earlier. Isolate the lower lip and mask it, so you can work the upper lip on its own. Using the Standard brush with Alpha 01, create a ledge around the lip. This shelf will form a division between the soft fleshiness of the lips and the face itself. This feature is more pronounced on some mouths than others, so use your own judgment when sculpting it.

[Ctrl]-click to invert the mask, then adjust the shape of the lower lip. The Move brush is used almost exclusively here to create a realistic positioning of the lips in relation to each other. You want the upper lip to overlap and rest on the lower lip. Use the ClayTubes brush with the alpha off to create the fleshy pillows of fat that form the structure of the lips themselves. You could also use the Inflate brush with a low Z Intensity setting to help inflate and pucker the two lips together, so it feels like they are actually pressed together. At the corners of the mouth, be sure to create a circular pillow of fat: this will help avoid lips that look like they're sliced into the face.

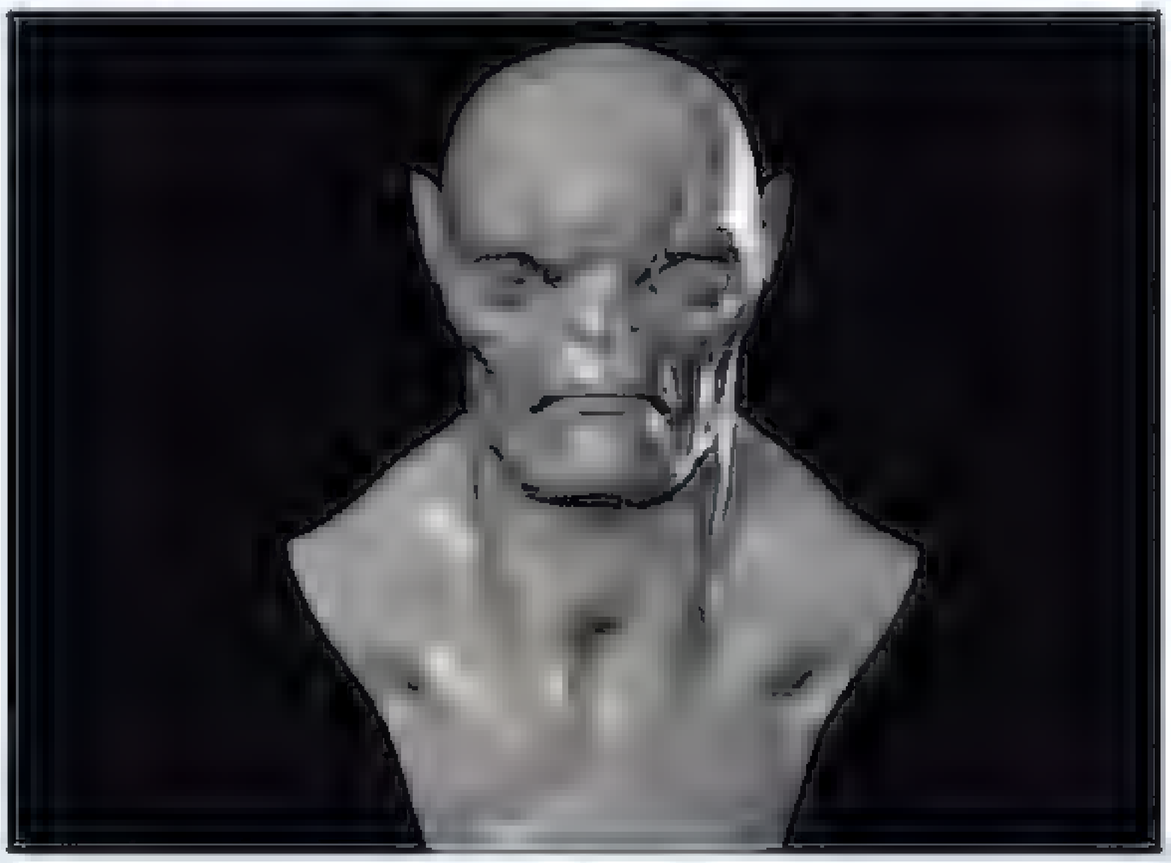
In the video, I also make some adjustments to the jawline to create a more aggressive facial structure. Thick jaw bones and muscles communicate a predator; you'll find this jaw configuration in most aggressive characters

Stage 3

Creating new shapes with GoZ

GoZ functionality has been available with ZBrush since 2009, but only with ZBrush 4 has it become a documented, fully functional feature. GoZ enables you to take a model from ZBrush into any supported 3D application. There you can edit geometry or UVs, change position or scale, or even add new parts. When you transfer the model back to ZBrush, the lowest subdivision level of the ZTool is updated to reflect the changes, and any sculpted detail is maintained. This workflow allows total control over your model.

Previously if you needed to change the topology or add entirely new geometry, the process was difficult if not impossible to accomplish. It was best to start ZBrushing on a mesh that was unlikely to require any changes. Now with GoZ, any changes you need to make are as simple as a button press to load your model in Maya or another of the supported packages.



Video 5
Before you press the GoZ button to transfer your mesh into Maya or another package, reduce your subdivision level to its lowest value



Video 4
Knowledge of anatomy will help you add telling details, such as the circle of fatty tissue that's present to either side of the mouth

Video 5 00:05

Use GoZ to make the horns

It's time to add long, elegant horns to the demon's head. This cannot be accomplished by pulling the geometry out from the head itself: it would stretch the underlying topology too far. When the mesh is stretched beyond its limits, it will not subdivide cleanly or take detail, and you end up with faceted strange-looking forms. By extruding new geometry, there is an underlying mesh that can be subdivided and that will capture any details you may choose to sculpt on the horn. You'll be detailing the horns quite heavily for this project, so this level of resolution will be required.

Step down to the lowest subdivision level of the mesh and press the GoZ button in the Tool menu. This will export your model to the 3D application of your choice. ZBrush will initially scan for any programs supported by GoZ. (I use Maya in the video.) If this is the first time you've run GoZ, ZBrush will prompt to install the necessary scripts: you need to be logged in as an administrator for this to work. The exported mesh will open in your package once the process is complete

Video 5 01:09

Work inside Maya with GoZ

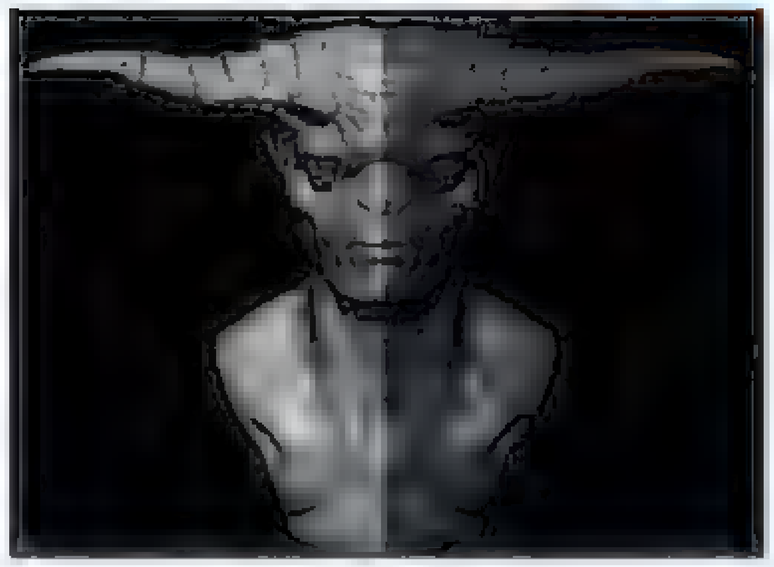
At this stage, you can make any changes you like to the model. Keep in mind that while ZBrush will try and retain the sculpted details, GoZ works on a proximity transfer. Any areas that don't move from the original position will retain their details. If you move geometry drastically, it may not transfer detail in that area.

I select faces to the side of the forehead and extrude them using the Extrude tool. Make sure to slide new edge loops, so the horns are composed of several evenly spaced spans. You can make further changes here with the Maya modelling tools, but I choose the faster route of returning to ZBrush



Video 5

Scott uses the combination of a ClayTubes brush and no alpha throughout this project: it enables him to introduce mass into recessed areas quickly and easily. The Inflate brush can also help add mass



Video 6

Ensure that you haven't inadvertently distorted your sculpture's form by re-instating its symmetry



Video 6

Use ClayTubes on narrow masked areas to build up form and establish a layered effect on the horns

and shaping the horns using the Move brush. When you're ready to return to ZBrush from Maya, simply select the mesh and press the GoZ script button located on the shelf. This automatically exports the model. ZBrush will prompt you to ask if you want to transfer the details.

Once the model is imported back into ZBrush, the details will transfer. If you find that you do not get a good transfer you can change the Dist slider under Tool > Subtool. This slider gives you some control over the mesh transfer. Simply undo, return to Maya and press the shelf button again to repeat the process.

Video 5 05:03

Detail the neck

Using the ClayTubes brush with no alpha enabled, stroke across the neck anatomy. Try to keep your strokes in the opposite direction to the major muscles of the neck. Because the ClayTubes brush will add into the recessed areas first, this has the effect of creating the impression of skin and tendons stretched over these large muscle and bone forms.

The best way to create the impression of skin over anatomy is to cross-stroke in this manner; filling in parts of the shadow area implies a membrane of flesh and fat stretched over the forms beneath. Think of it as a wet sheet draped over a sculpture, which lets only some of the forms to be seen through.

Video 5 06:15

Refine the sculpture

Use the ClayTubes brush with no alpha to sculpt between the high bony landmarks of the face. Drawing strokes from the cheekbones to the chin and mouth, for example, helps to create the impression of stretched skin in these areas. You may also choose to use the Inflate brush with a low Z Intensity and a high Focal Shift to create a plumpness in the folds of flesh.

Some planes are suggested in the cheekbones by using ClayTubes with Zsub on. It's important to remember that organic forms often have a planar element; losing this level of form can make the head look soft and generic. Plane breaks allow you to define form.

Video 6 01:37

Restore symmetry

Over the course of sculpting, it's common to discover you've lost symmetry on the model. There's no cause for alarm: there's a simple method of reintroducing symmetry to the ZTool.

Select the MaskRect brush and marquee-drag a mask over the side of the model you want to preserve. Remember to turn off Symmetry first, otherwise both sides will end up masked. Once the 'good' side is masked, select Tool > Deformation > Smart Resym. This mirrors the vertex positions from the masked side to the unmasked side, returning symmetry to the model.

Realism is always asymmetrical, to some degree, of course, so you'll want to break the symmetry of the model before completing it. You do this by introducing intentional variation between the sides. This is especially important when adding skin details. If you detail the model with Symmetry on, you will get conspicuous patterns down the centre line of the head. Try to introduce as much randomness as possible in the last stages of the sculpture, and it will appear far more natural.

Video 6 05:30

Sculpt horn detail

At this stage, you want to detail the horns. Aim for a layered texture similar to the look pictured in the above-right screenshot. You can accomplish this effect through a combination of ClayTubes, masking and the Move brush. Mask an area for a scale then invert the mask by [Ctrl]-clicking. Use the ClayTubes brush to build the edge, then use the Move brush to pull the edge to the right so it overlaps the layer next to it. This helps create a sense of depth and realism to the texture. It should feel like layers of horn surface wafering over each other.

The striations down the length of the horn are created with the Standard brush and DragRect stroke with Alpha 58. You can also use the Standard brush with Alpha 01 to create long, sharp scratches down the length of the horn. This helps break up the surface regularity and give the horn a realistic weathered look.

Video 6 10:27

Detail the skin

Give the skin an overall pass of pore texture using the Skin1 brush, which enables you to quickly work in an extremely natural pore texture across the whole head. In its default state, however, the Skin1 brush has a strange tendency to deform your sculpture. To correct this, select Alpha > Invert. Now using the brush will only add skin detail, and will not deform the underlying model.

You can subtly alter the skin texture by swapping the brush's default alpha for Alpha 56. Be sure to invert the alpha. Once this is brushed in, select the Standard brush and Alpha 58. Using circular strokes, brush in a crosshatched skin texture over the shoulders, as well as other areas of the head where the skin might be tougher and thicker. Be sure to put some level of detail over the whole head, but vary the intensity of the detail. Putting the same pore texture at the same scale and strength across the entire sculpt looks highly unnatural, and results in a noisy surface effect. ■



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Under the sea

PART 6 Continuing his series on basic lighting principles, **Michael McCarthy** explains how to set up an underwater scene – an environment where light is hard to come by

Lighting an underwater scene is quite different from most lighting setups you'll create. While the key principles of three-point lighting can be used, there's a lot of room for artistic expression.

In reality, of course, there is little to no light underwater depending on your depth. For this reason, there's usually a component of light coming down from the surface and one behind the camera. It's important to introduce enough light to be interesting and to be able to see what is needed in the scene without breaking the illusion with too many unrealistic light sources.

Fog, volume light, light beams and caustic light effects are among the components that help sell an underwater environment. Start off with a key light from above and assign it as a volume light. Set a low multiplier for the light and give it a volume colour of dark blue. Adjust the falloff of the light as well, so the volume recedes into the darkness. This will give the type of fog falloff that you tend to see underwater. Next, turn on shadows for the light and position it so that it casts some light beams off any rocks in the scene. Finally, set up a low-multiplier omni or point light to bounce off the rocks at the bottom and add some more depth to the scene.

Adding caustics to the scene adds realism. When light travels through a refractive surface like water or glass, the bent light can converge and produce a bright caustic pattern, like you would see at the bottom of a pool.

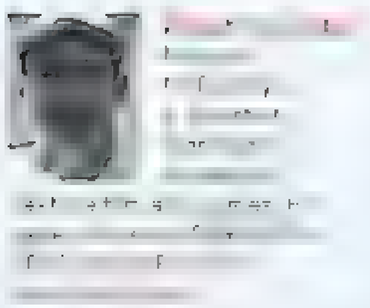
Caustics can be set up in many ways. If you have a raytrace renderer like mental ray, you can produce real physical caustics in the scene. As with many raytrace solutions, this can take some time to set up and may increase your render times significantly.

In an underwater scene like this, it's a better idea to use a projection map, which allows light to shine through, like a gobo on a studio lighting set. Duplicate your key light and apply a black-and-white caustic map in the projection map slot. This will shine the light through the map and produce a convincing caustic pattern on the rocks.

Finally, add the caustic light as a volume light. Since the light is projecting through the caustic map when added as a volume light, it produces interesting light beams that shimmer through the water. Tune the intensity of the light as well as attenuation parameters for a more realistic result. Underwater scenes are sold through mood, colour and volume. Adjust your lights effectively, and you'll have a rich-looking render without outrageous render times.

Next issue: Part

Michael shows you how high-dynamic range imagery can transform your lighting schemes





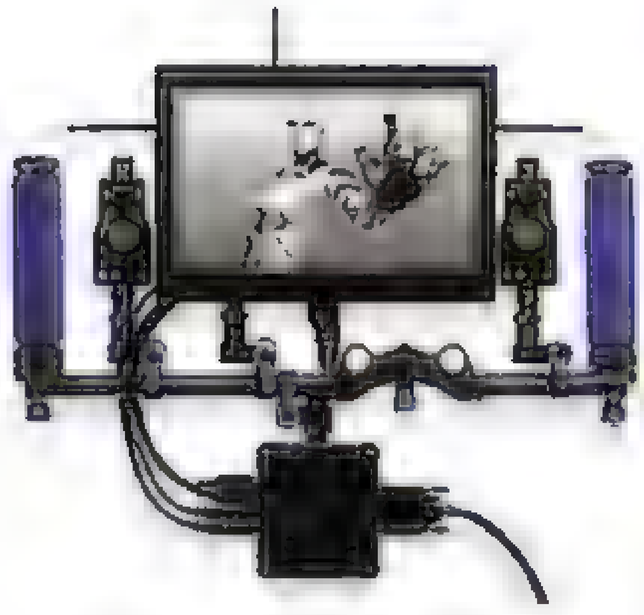
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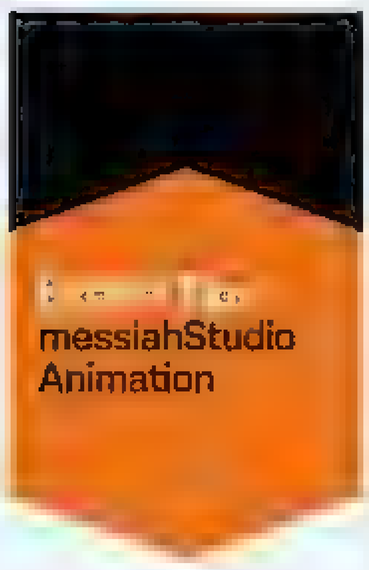


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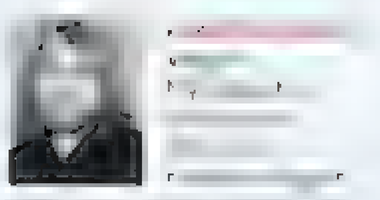
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Get the most out of messiahStudio

Whether you're getting to know this versatile animation tool or have been using it for years, **Vegard Myklebust's** power-user tips can help you work smarter and faster



Although it's been around for over a decade, messiahStudio has rarely enjoyed as much attention as it did this February. Developer pmG launched a special offer for its animation and rendering package, making the $499 standard edition available for just $10 and the $1,195 pro edition available for $40. The catch? The prices applied only if enough people ordered it in time.

The result was a flurry of online community activity as excited buyers spread the word. The goal was reached, and the messiahStudio community welcomed many newcomers.

The tips I've chosen for this focus on messiahStudio are designed to help both these new users and old hands get a better grasp of some of this program's powerful tools. All the tips relate directly to character animation, rigging and rendering work, which is the primary focus of messiahStudio and of my own work. Each tip, though practical in use, is primarily designed to help you find a starting point for your own ideas, not to be a blueprint of what you must do.

Most tips go beyond what you'll get from reading the manual or doing the basic free tutorials and, in some cases, they require quite some understanding on the part of the reader to get the full extent of their usefulness. To help your research, I've provided video demos, result videos, and start and finished project files for you to look at.





messiahStudio is a highly capable package for animation and rendering. The tips this issue come from Vegard Myklebust, who uses the package for creating commercials and shorts

01 Set messiah up to work how you want

There are a lot of settings in messiah to enable it to work the way you want. Most of the pro users customise it to full effect. In the Edit tab, for example, click the top pull-down menu and select Key/Frame Editing: here you can choose options like having separate manipulators instead of the default combined one.

Under Customize tab > KeyCommand Manager, you can tie various functions to whatever key you might want. You can also add new commands, for instance ones that call scripts, and tie those to a key. You can also access a lot of functions by right-clicking each of the top tabs.

02 Clicking right

There are a lot of interface components in messiahStudio that change their behaviour according to the mouse button you use. When you're exploring, try right- and middle-clicking elements in the interface: they often have additional options from when you make a simple left-click.

03 Any field will do

Any input field in messiah can compute an expression or maths function. When you press [Enter], it will compute and place the new value in the input field.

04 The importance of a lightweight rig

However much people might cry about wanting extra functions in a rig, it's easy for it to suffer from feature creep. Keeping out elements that will only get used once or twice over the course of a whole production makes sense: when they all add up, they can certainly reduce the frame rate.

The most important thing is to keep the vertex count low. There's no problem using a lot of bones – they'll compute fast, and messiah is designed to deal with them. Always consider what can be done to keep the frame rate high: it will matter a lot more for the outcome that the animator can see what they're doing well than that the rig is overly fancy

05 Simple reactions

This is a pretty fundamental concept in messiah and is well documented, but I'm re-iterating it here to make other tips easier to follow for new messiah users. Load Simple reactions_Start.mpj from this tutorial's scene files. Select Setup tab > Items tab > New Item and double-click Slider to add it to your scene. Under Command tab > Variables tab, click New Variable. Select the xpos channel by clicking its slider triangle. In the Expression tab, click the button next to the Buffer field. The expression [Slider:xpos] pops into the Buffer. Copy and paste this into the Exp field and edit it to read **[Slider:xpos]*pi2** (to calculate a position around a circumference).

In the Channels tab, pick Camera from the drop-down menu and click the + button. Pick heading in the channel drop-down at the bottom. When you drag the xpos slider from 0 to 1, the camera will rotate between 0 and 360 degrees. Though simple, this method allows complex linkages.

Tips author Vegard is one of the team working on the upcoming short 850 Meters





06 Animating eyes

Procedural animation can help you do a lot of things you would otherwise animate manually. messiah has a lot of good expressions and tools that can help you achieve useful effects quickly.

Tiny, darting eye movements, or saccades, can help your characters look a ot more alive. Load Procedura. Animation_1_Eyes_Start.mpj. In Command tab > Variables tab, click New Variable In the Expression tab, scroll through the drop-down menu to find EyeDart. Add any value for Seed, and values of around 1 for Frequency, -1 for Min and 1 for Max. A lower Frequency value wi l create more frequent eye movements. The Seed value .s the random element: feed a d fferent one for each character to make sure they don't do their saccades at the same time. If you feed a slider's values to Frequency, Min and Max, you can key how fast or pronounced the saccades will be; see the accompanying video for help

Right-click the button next to the expression drop-down menu to finalise. In the Channels tab, pick the eye2_Layer2 object and he the value to heading or pitch; repeat with eye2_Layer2_1. Press Play to see the rapid eye movement.



07 Animating tails

Setting up procedural motion for a tail can provide both a fast way of working through scenes and an intuitive interface that the animators can key. It's good practice to make sure the animators can add their own keys over the top of the procedural motion.

Load Procedural_Animation_2_Tail_Start.mpj. Add a slider via Setup tab > Items tab > New Item. Rename the first three channels to **Curl**, **Offset** and **Frequency**. Hide unwanted channels by right-clicking their coloured dots. Under Command tab > Variables tab, click New Variable seven times. In order, rename them to **TimeFactor_Exp**, **Frequency_Exp**, **Curl_Exp**, **Offset_Exp**, **EndWave_Exp**, **StartWave_Exp** and **ApplyMotion_Exp**. In the Expression tab, add the following expressions for each variable.

- For TimeFactor_Exp, add **NOW/100**
- For Frequency_Exp, add **[Slider:zpos]*10**
- For Curl_Exp, add **[Slider:xpos]*2-1**
- For Offset_Exp, add **[Slider:ypos]-0.5**
- For EndWave_Exp, add **TimeFactor_Exp *Frequency_Exp**
- For StartWave_Exp, add **EndWave_Exp +Offset_Exp**
- For ApplyMotion_Exp, add **ChainWave(TR_Tail05,TR_TailBase,heading,EndWave_Exp, Curl_Exp,StartWave_Exp)**

Now you can play with the values to get different types of procedural tail motion. Try the values 0.6 for Curl, 0.9 for Offset and 0.2 for Frequency.



08





09 Conditional reactions

Conditional reactions are basically if/else statements to find out if a condition has been met, then act accordingly. In this example, you'll set up a method of automatically raising the clavicle bone when the arm comes up. The accompanying video shows the full workflow.

Load Conditional_Reactions_Start.mpj. In Command tab > Variables tab, click New Variable three times, and drag the three variables to the top of the item list. Call the first variable **EvaluateIK** and enter **IK2D(Clavicle,Hand,IK_Goal,1,1)** as the expression, which evaluates an IK chain all the way from the clavicle to the hand. Call the second variable

Conditional reactions in messiahStudio help bones respond automatically to movement elsewhere: here, the clavicle moves with the arm

in the list **LimitTheClavicle**; set **Clamp([Clavicle:pitch],[Clavicle:pitch],0)** as its expression, and link it to Clavicle:pitch.

Call the third expression **CheckIfLimitIsReached** and set **cond([Clavicle:pitch]==0,IK2D(UpperArm, Hand,IK_Goal,1,1),0)** as the expression. This expression is the conditional reaction: it checks if the clavicle has reached its limit, and evaluates a new IK chain if it has.



10 Using the breakdown slider to full effect

The breakdown slider in the bottom-right of the viewport comes into its own when you keyframe systematically. You can set keys for the whole character as you're doing your poses by filtering the item list (click All Items to change the filter) and creating keys via Use Item List, then refine selected body parts with the breakdown slider.

Load Using the breakdown slider Start.mpj. To access the Graph Editor, drag up the top of the timeline. Click Selected Items (small text, far left) and select Use Item List. Pick Vincent_Root in the item list. At frame 14, take the breakdown slider to about 0.4. Change Use Item List back to Selected Items and [Shift]-select Vincent_FK_UpperArm_L to Vincent_FK_Hand_L. Pull the breakdown slider to 0.2, delaying the whole arm further.



11 Setting up SSS for a toony skin shader

Sub-surface scattering in messiah is fast and gives great results. It's defined in the main material (Render tab > Materials tab > Basic Properties tab) as Translucency. Translucency, Diffusion and Reflectivity shading are intrinsically linked: they're all ways of treating the same kind of light. In practice, this means that to live in a 0-1 light space, the values for Diffusion, Reflectivity and Translucency should add up to 1.

Load SSSForToonySkinShader_Start.mpj and select the Skin material. Set both Translucency and Diffusion to 0.5 (so you have a total of 1). Next to Translucency, change the type to Uni_Limit, and set Limit to 1. SSS is size-dependant; in this case, Surface Thickness looks about right at 0.01 (equivalent to 1cm thick, not like real skin values). Set a red tone for Translucency Atten Color, and allow GI to scatter using Scat – around 0.4 will suffice. Press [F9] to render.

12 Getting more out of DollEyes

messiahStudio comes with a useful shader called DollEyes. To set it up, go to Render tab > Materials tab and choose a material, then right-click in the node view and click New Shader > DollEyes. Drag the Radiance output from DollEyes to your material's Radiance input

The DollEyes shader uses a target to identify where it's looking. If you enable Target Dial, scaling that target item will cause the pupil to increase and decrease in size within the iris. If you wish to texture the iris itself, right-click in the node view and pick your shader from the New Shader menu, then drag the Color output from that shader to the Color input of the DollEyes shader. In the DollEyes shader, reduce the relevant A (for Alpha) channel to increase the amount of colour information the shader picks up from the input. To try it out on a pre-made scene, load Getting more out of DollEyes_Start.mpj.



13 Squash and stretch with muscle bones

Muscle bones in messiah provide a quick way to set up squash-and-stretch controls on your model. They can directly deform the mesh, or they can be used as a way of deforming other bones, which in turn deform the mesh by parenting the other bones to them. This tip shows both uses.

Load Squash and Stretch with muscle bones_Start.mpj. In the Setup tab, pick Mouth_SnS_Bone in the item list. In the Bone tab, enable Muscle Bone. In the Target drop-down list, pick Mouth_SnS_Target. If you go to the Animate tab now and move or rotate the Jaw bone, you'll see that the nose and upper lip is squashing and stretching to reach its goal.

Now pick Head_SnS_Bone. In Setup tab > Bone tab, enable Muscle Bone and pick Head_SnS_Target. Back in Animate, you can now squash and stretch the whole head using Head_SnS_Target.



14 Driving a texture with a bone

Messiah's texture deformer allows you to remap an image to sit on a surface in an unusual space, namely the space of one or more bones. This allows you to use displacement images in bone space to drive under-skin effects like tendons and muscles.

Load Driving a texture with a bone_Start.mpj. You'll see five bones that you're going to remap the same texture to. These bones don't deform the mesh themselves. In Render tab > Materials tab, pick the Default material. Right-click in the node view and pick New Shader > Texture Map. In the Image tab, click (none), select Load Images and browse for Tendon16bit.tiff in the scene files. Reveal its outputs by clicking its right + button.

Right-click in the node view and pick New Shader > More > TextureDeformer. Reveal its inputs by clicking its left + button. Drag Color output from Texture_Map to Color input on TextureDeformer. Drag Color output from TextureDeformer to Bump input in the Default material. Set Bump to 0.025 in the Default material. In TextureDeformer set Type to bone, Tool to TextureBones, Mask Width to 0.15 and Mask Feather to 0.35

Hide the bones (select None from the visibility icon in the Item List) and you should be able to see the tendons under the skin in the viewport. Increasing the subdivision level will make the result smoother, while ramping up the Bump value will make them more obvious.

15 Like a setting? Save it!

You can set up your own material library to load from the [F5] menu by right-clicking the material in Render tab > Materials tab and placing it in the right folder. If you right-click Render tab > Settings tab, you can also save all your render settings, such as GI.

16 Effects can be used in conjunction

Bone_Deform is just the start of your rig: there are a lot of different effects that enable you to get more complex reactions in your mesh. Play with them all, and get a feel for what they can do.

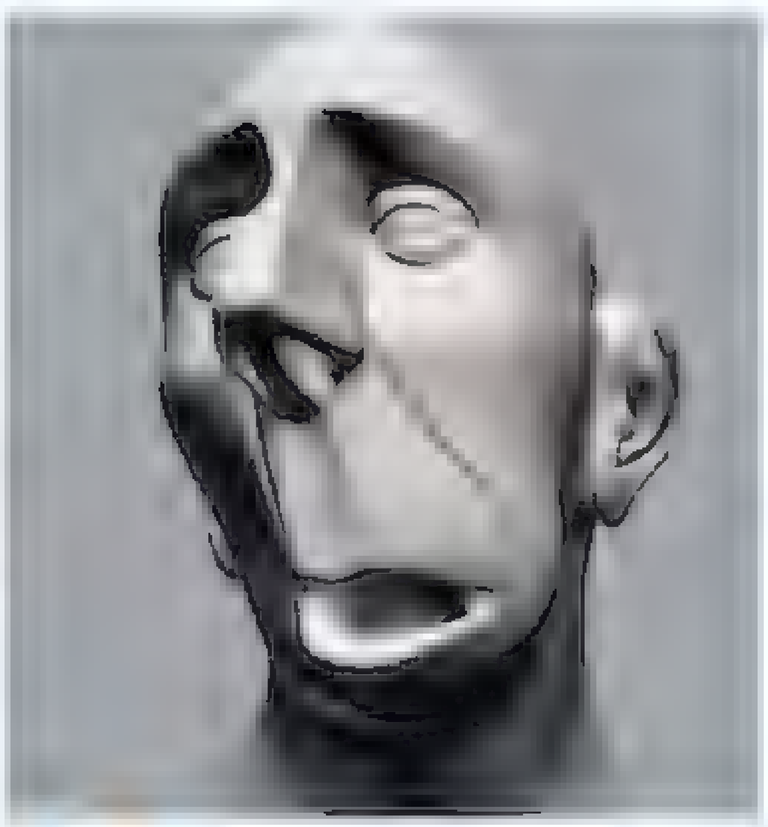


17 Controlling morphs with MetaEffectors

MetaEffectors and the other weight tools in messiah can do a lot more than just weight bones. One great way of using them is to weight the effect of a morph. MetaEffectors can calculate the effect of a morph on the fly in combined weight mode. You can animate where on the object the morph should take place, giving you asymmetry that is easily animatable.

Load Using_MetaEffectors_With_MorphBlender_Start.mpj. In Setup tab > Tools tab, pick MetaEffector from the drop-down list and click the + button. Pick MetaEffector in the item list. In the MetaEffector tab, click Add Effector. Highlight MetaEffector in the Item List again. In the Weight List tab, [Ctrl]-click the Head object in the list and click Add Items To Weight Drawing List. Click the s in the Weight List twice so it says c. Pick Morph_Slider in the Item List; under Cluster Value tab > Weight tab, set the MouthOpen drop-down to MetaEffector

To see the effect, click the Animate tab: when the MouthOpen slider is set to 1, you can drag the MetaEffector to apply the morph target, with a corresponding falloff



18 Using DelayPoints for jowl movement in faces

DelayPoints is a versatile new deformer in messiahStudio 5. It works by non-linearly delaying the vertices over the preceding 10 frames, with inputs for weight and a reduction of the effect based on the direction the vertice travels. You can use it for doing smear frames, geometry-based motion blur or, in this example, soft-body motion.

Load Using DelayPoints for Jowl Movement_Start.mpj. Select the Head object in the item list. Under Setup tab > Effects tab, use the drop-down to pick DelayPoints and add it to the Head object by clicking the + button. Now pick DelayPoints in the item list. In the Delay Points tab, set Weight to Jowl_Weight Switch to Animate tab and click Play. While the animation is playing, adjust the Delay slider to suit; about 0.09 is probably enough for this motion. ●



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FOR
Maya 2011

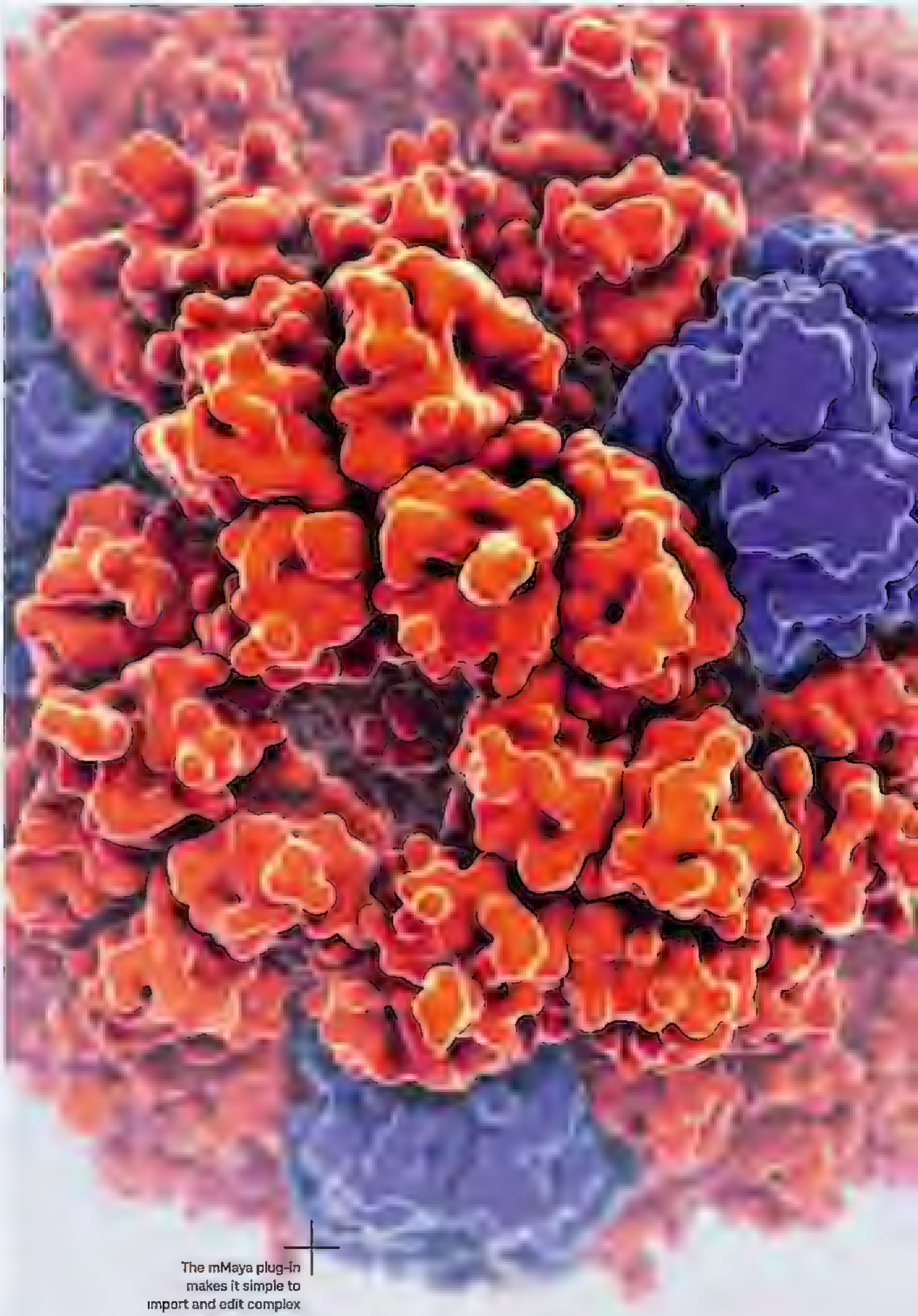
ALSO REQUIRED
Molecular Maya

TIME TAKEN
40 minutes

TOPICS COVERED
- Molecular Maya
-
-

ON THE DISC
- Scene files
-

ON THE WEB
- Video tutor a



The mMaya plug-in makes it simple to import and edit complex molecular structures



Build a virus in Maya

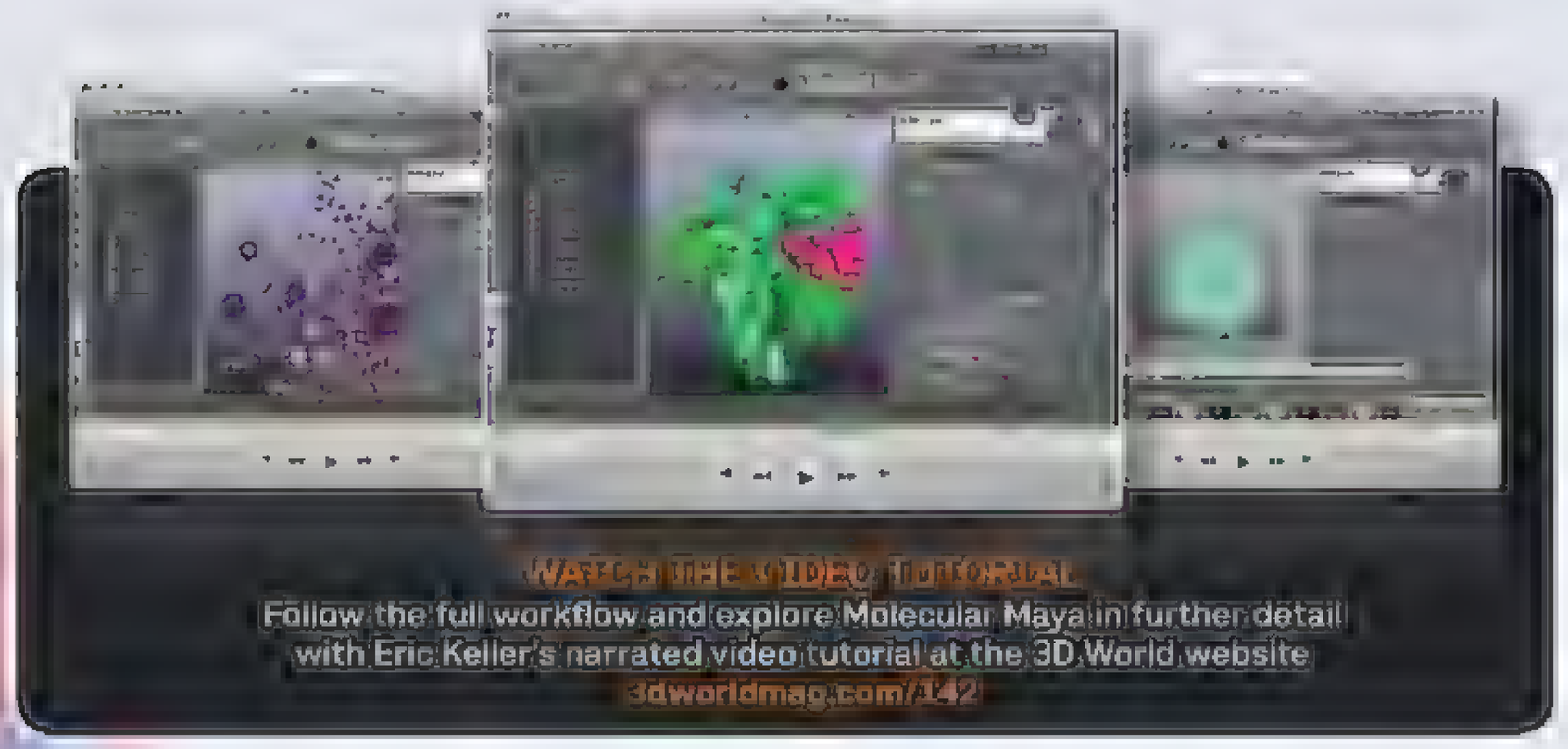
36 minutes of video at 3dworldmag.com/142

Eric Keller demonstrates how to use the Molecular Maya plug-in to easily build an accurate model of a virus in Maya 2011

Imagine yourself as a visual effects artist working on a science-fiction TV series like Fox's Fringe. Imagine that the plot of an episode of the show involves a virus that infects bacteria. The genetic code of the bacteria is altered by the virus, then the bacteria is used to infect the populace – which, as usual, leads to mayhem and carnage in the streets.

The director is asking for a computer model of the virus, and insists that it look realistic and accurate – in other words, not your typical glowing lump of CG goo. Not too long ago, this would have been a fairly tall order: you'd find yourself having to sort through a variety of specialised molecular modelling software packages and scripts with limited capabilities. But thanks to a free plug-in called Molecular Maya (or mMaya), you can easily download the structure of thousands of proteins directly into a Maya scene. What's more, mMaya offers you a variety of ways to represent the protein structure, as well as tools for rendering and animating the dynamic properties of the structure.

mMaya is designed to be used by scientists to more easily create animations of their research, as well as animators working in scientific visualisation. The idea behind the plug-in was to make it easy enough to use so that a scientist with limited experience with Maya can quickly get his or her desired structure in Maya and even render it with as few button clicks as possible. The plug-in links Maya to an online database of proteins that holds thousands of atomically accurate 3D co-ordinate files. Once you know what you're looking for, you can model a virus structure in just a few minutes. »

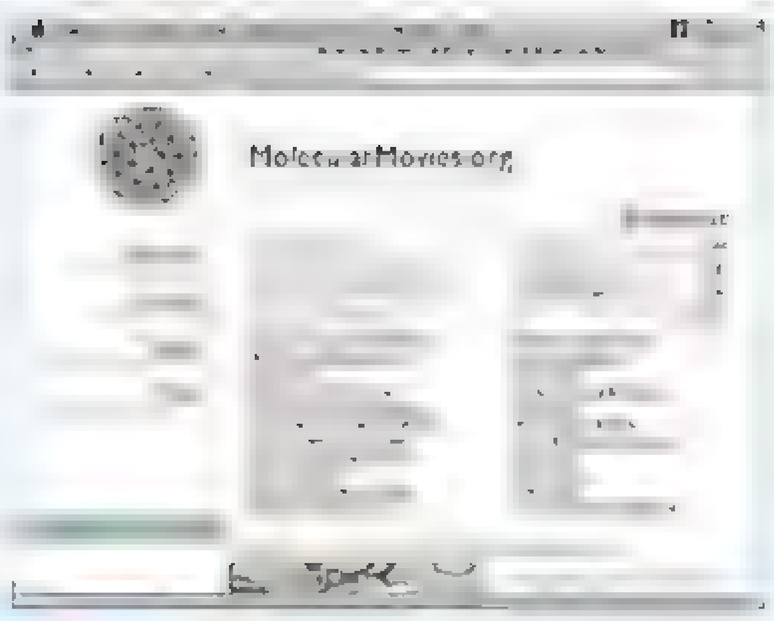


WATCH THE VIDEO TUTORIAL
Follow the full workflow and explore Molecular Maya in further detail with Eric Keller's narrated video tutorial at the 3D World website
3dworldmag.com/142

STAGE ONE

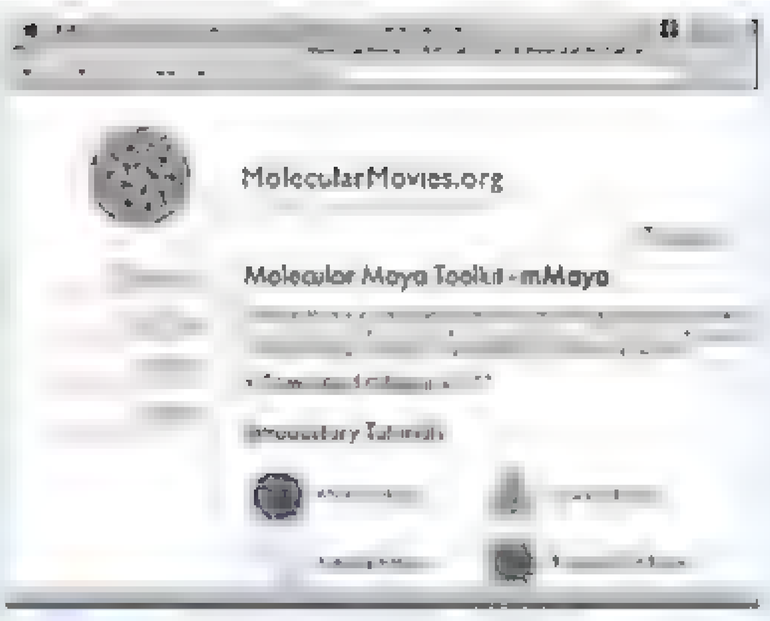
Set the parameters

You'll start by installing the mMaya plug-in, which is free to download and use. It's a collection of open-source MEL and Python scripts written by Campbell Strong. The plug-in was designed by Gaël McGill, a faculty at Harvard Medical School and founder/CEO of Digizyme, which offers a variety of design and animation services for scientists working in the fields of cell and molecular biology, as well as the biotechnology and pharmaceutical industries.



01 Go online

To download the plug-in, visit **molecularmovies.com/toolkit**. Molecular Movies is an online showcase of the best molecular and cell animations in the world. There's also a large number of tutorials offering techniques for creating scientific animations in Maya and other software. Click on the Toolkit link on the left side of the screen.



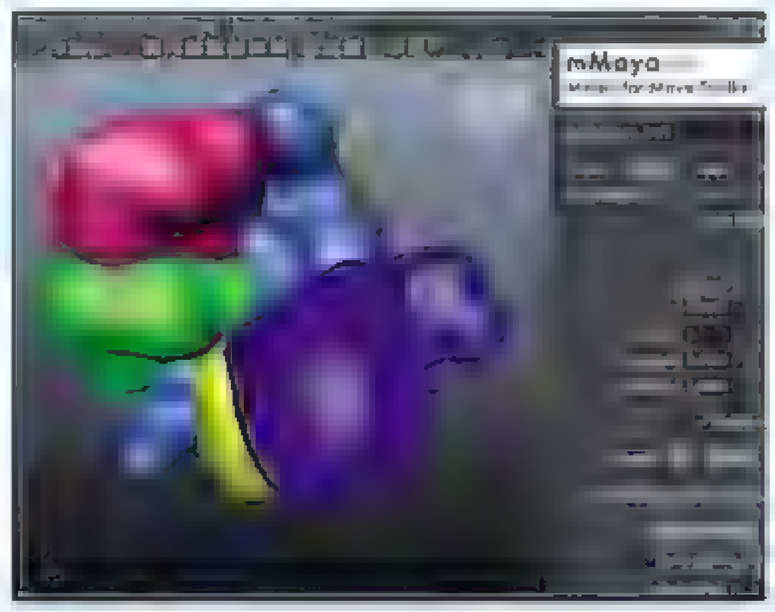
02 Click the Download mMaya link

The plug-in is free, but you need to fill out some basic registration information and a short survey. The plug-in is available for Windows and Mac OS X, and supports Maya 2009 or later. The download web page includes mMaya tutorials that offer an in-depth overview as well and information on advanced features. Watch the Installation video to learn how to install mMaya.

STAGE THREE

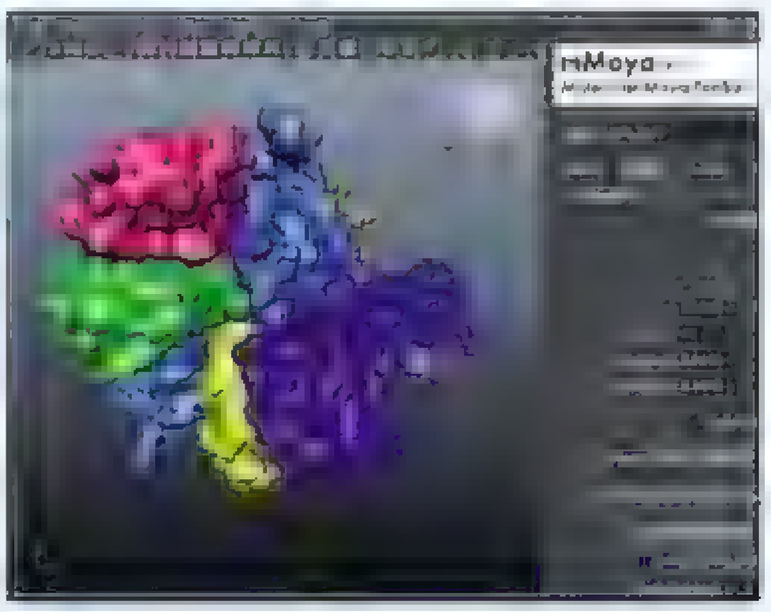
Create the structure

Scientists use a variety of styles to represent molecules that are often too small to see even with an electron microscope. These representations reveal how a protein's structure affects its behaviour. For our TV show, you may use one style to show the virus itself infecting bacteria in a realistic animation, and another style for when the scientist describes the structure to our show's heroes using a computer monitor. mMaya lets you choose and combine representational styles using the controls in the mMaya interface. Let's start by making a surface mesh for the overall structure.



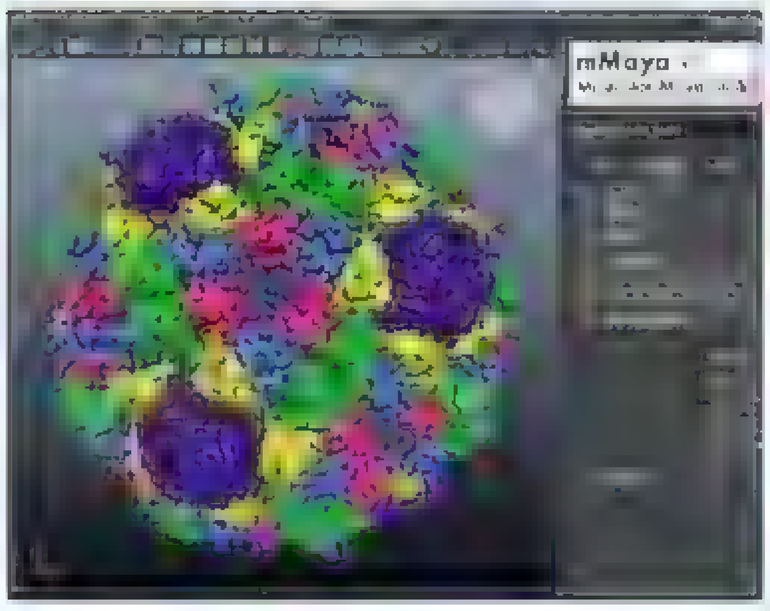
05 Create the basic mesh

In the Main tab of the mMaya interface, expand the Atoms rollout. Turn off the Atom Vis checkbox to hide the display of each atom. Expand the Meshing rollout and turn on Mesh Vis. After a few seconds, the mesh appears around the atoms. The structure looks like a bunch of coloured blobs. Each colour in the mesh represents a different part of the virus structure.



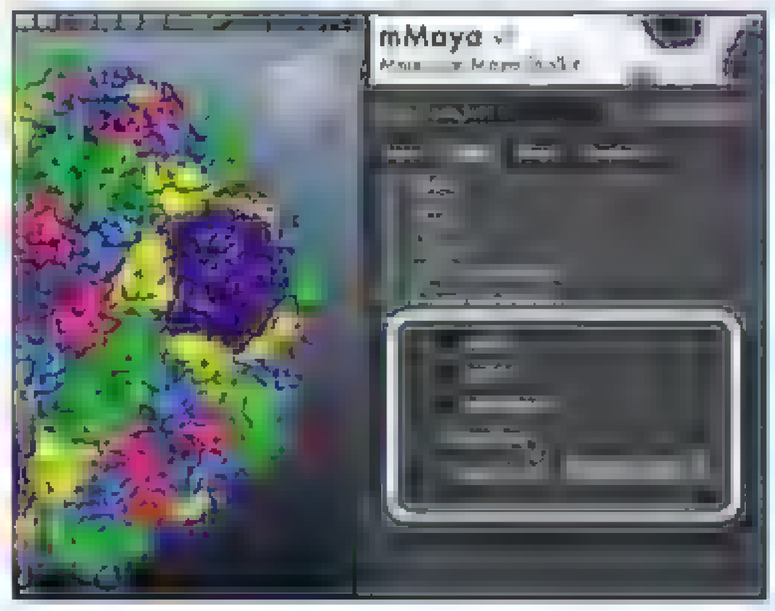
06 Add detail

To increase the detail, click the High preset: after a few minutes, the structure updates, and you can see the position of the atoms a little more clearly. The meshing is created by converting the nParticles in the structure to polygons. The result is the same type of mesh you might use for rendering liquid simulations in Maya.



09 Show the structure

Once the file has downloaded, the Biological Unit rollout provides you with a few options for displaying the structure in Maya. You can mix and match these as much as you like. In this case, turn on the Meshes option. After a few seconds, the complete virus appears; you may have to zoom out to see the whole thing.



10 Control the display

The Toggling Off option in Biological Unit can be set so that additional units are either hidden from view or deleted from the scene entirely when the options are unticked. When working with a large structure, the ability to turn the entire structure on and off makes working much easier. The copies of the original PDB file are instanced duplicates, which help to make the scene file smaller and easier to use.

STAGE FIVE

Bake ambient occlusion shadowing

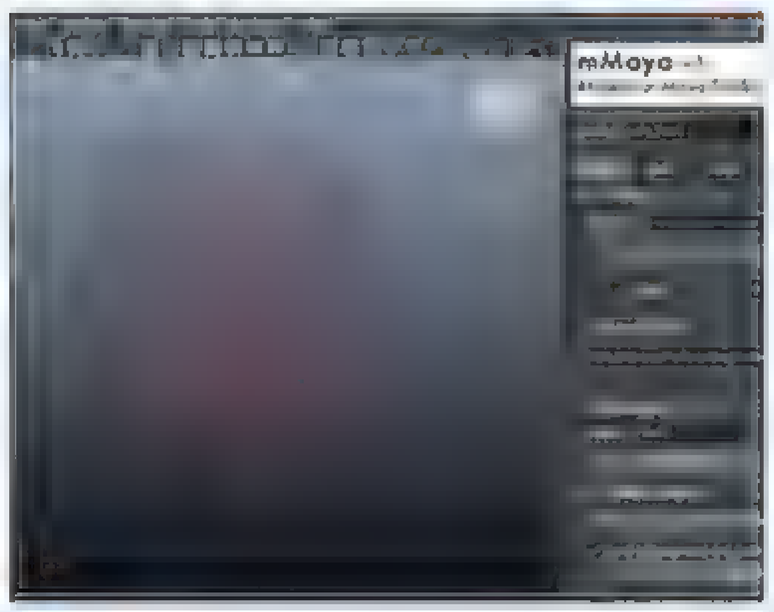
mMaya has several options designed to make it easier for novice users to create nice-looking renders without the need to get heavily involved with mental ray. You can render and bake ambient occlusion shadowing effects directly to the vertices of the mesh, which can help add a sense of depth to the structure itself. By baking the shadows to the mesh, you can quickly render an animation that looks as though it has been lit with global illumination, using Maya Hardware.

STAGE TWO

Extract the virus structure

The structure of viruses and other proteins are available for download from the Research Collaboratory for Structural Bioinformatics Protein Data Bank at rcsb.org. The structures are contained in a text file saved in the PDB file format, which lists the 3D coordinates of each atom in the protein, as well as additional information. The only trick to getting a specific file from the data bank is finding out the four-character code of the structure that you want to model. Determining this may take a little research, or help from a scientific consultant. The site's Molecule of the Month feature offers helpful articles about protein structures.



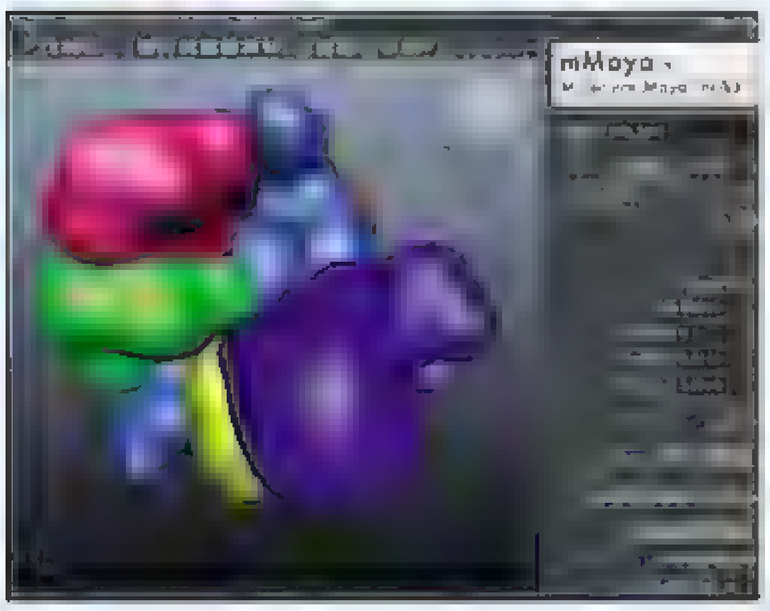


03 Choose your virus

After doing some research via the Molecule of the Month feature, your art director has determined that Bacteriophage phiX174 should be the star of your TV episode. This is the structure of a virus that infects E.coli bacteria. The article on this virus suggests you use the PDB id number 1cd3 to build this structure. Make a note of the code.

04 Get the virus

Open a new scene in Maya. Open mMaya via the molecule icon in the Status Line. In the Import tab, expand Download. In PDB id, type **1cd3**, then click Download Then Import. The downloaded structure appears in the scene as a point cloud. The structure is saved to your hard disk you can load it again using PDB file in the Import rollout. Just click the field and choose 1cd3.pdb from the list.



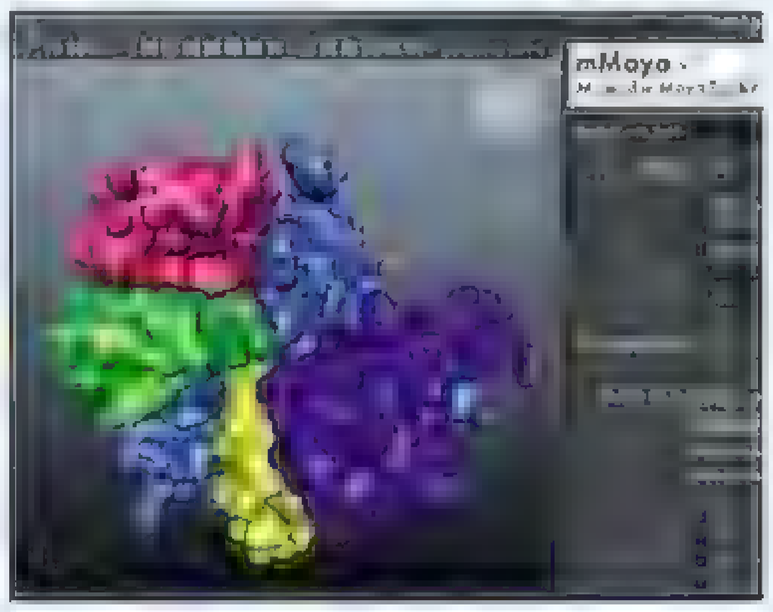
07 Adjust the mesh

You can customise the mesh without having to leave the mMaya interface. Just use the options in the Meshing rollout and click Update. The Update button is accessible only when Update on Demand is ticked. It may take time to update at higher resolutions.

STAGE FOUR

Examine the structure

If you examine the Bacteriophage phiX174structure in Maya, it looks nothing like the image shown in the Molecule of the Month article. What you're looking at right now is just a fragment: the full virus is made up of copies of this one chunk, arranged in a 3D pattern. To keep the PDB file simple, the scientists who solve the structure save only the coordinates of this one chunk. The arrangement of these chunks is stored in a second file, which you can instantly download using mMaya.



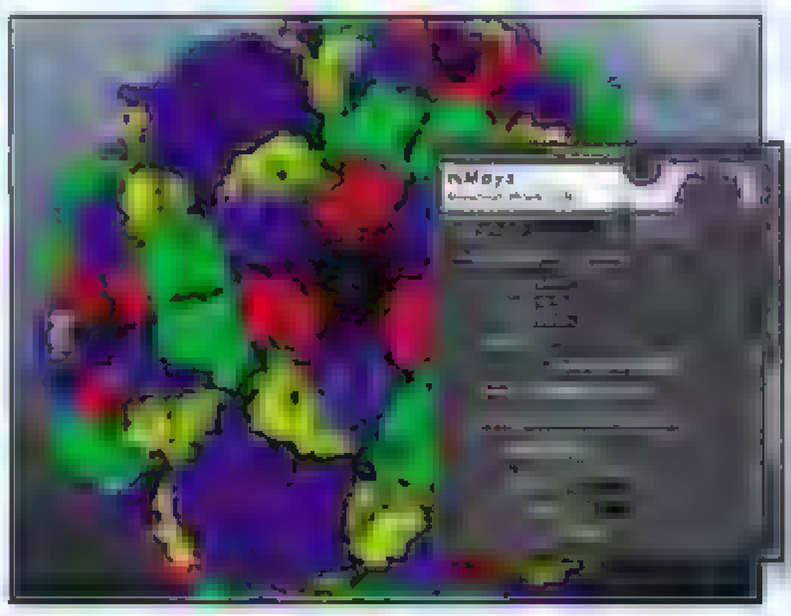
08 Get the structure

In the Biological Unit rollout, click the Download from PDB button. This downloads the information that enables mMaya to display the complete structure of the virus. This information is stored in a temporary file, and is available for use in other scenes that use the same virus.



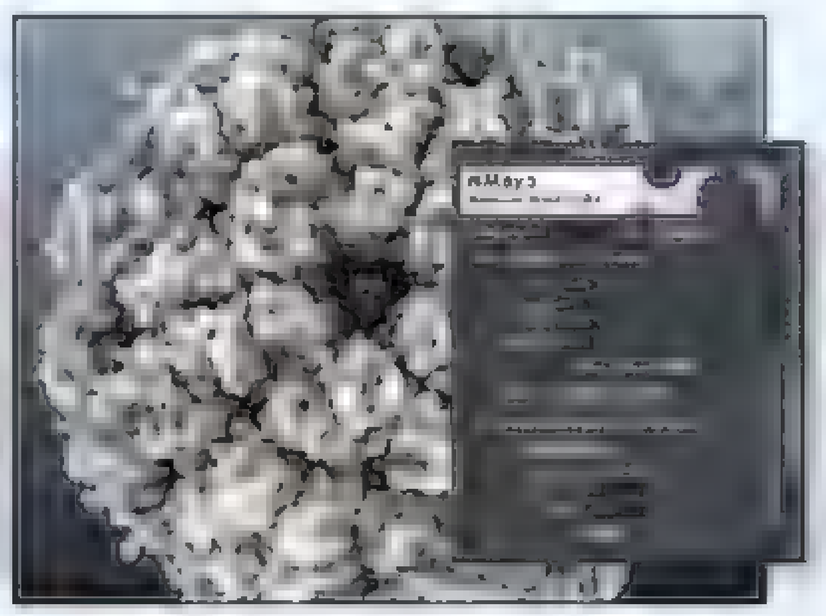
11 Set up the baking

In mMaya's Main tab, scroll to the meshing rollout and expand the Ambient Occlusion Color Per Vertex (CPV) Bake rollout. Turn off Bake to Black and White. Turning this option off will preserve the colour-coding of the viral sub-units. Leave Occlusion Rays set to 32; you can increase this to improve quality, but it will take longer to render.



12 Bake the shadows

Click the Bake button. Maya will render the shadowing; you'll see the mental ray progress bar in the lower left of the screen as the rendering takes place. The end result is a shaded version of the virus in the Maya scene.



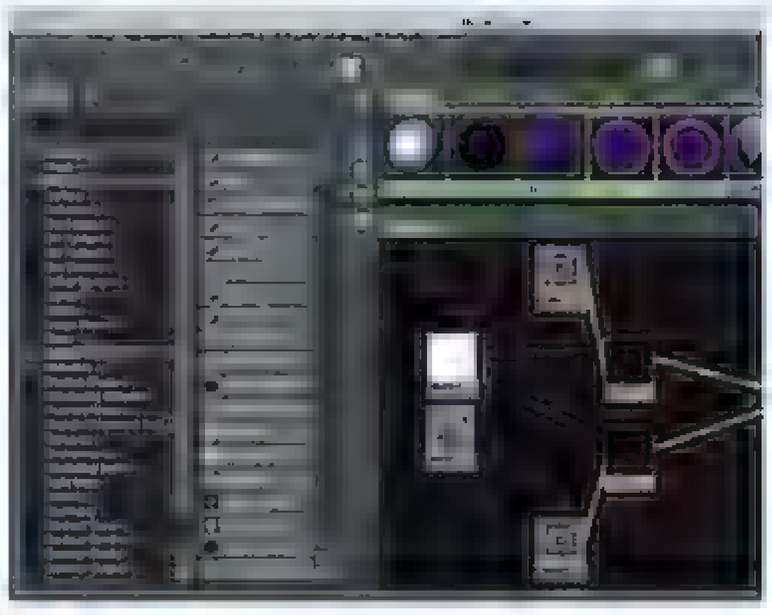
13 See only the shadows

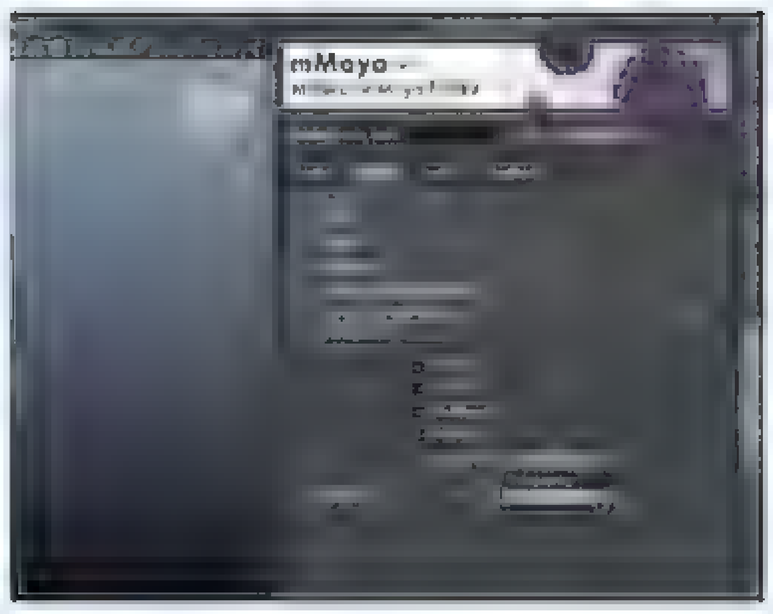
If you want to see how the shadowing looks in black-and-white, turn the Bake to Black and White option on and click the Bake button again Maya will render the shadowing again using mental ray, and the result will appear after a few moments.

STAGE SIX

Apply a custom shader to the mesh

You may decide that you want to use more advanced shading options and mental ray to create a more interesting look for your virus. You can change the settings of the shaders that are automatically generated by mMaya or apply your own custom shaders to the sub-units.



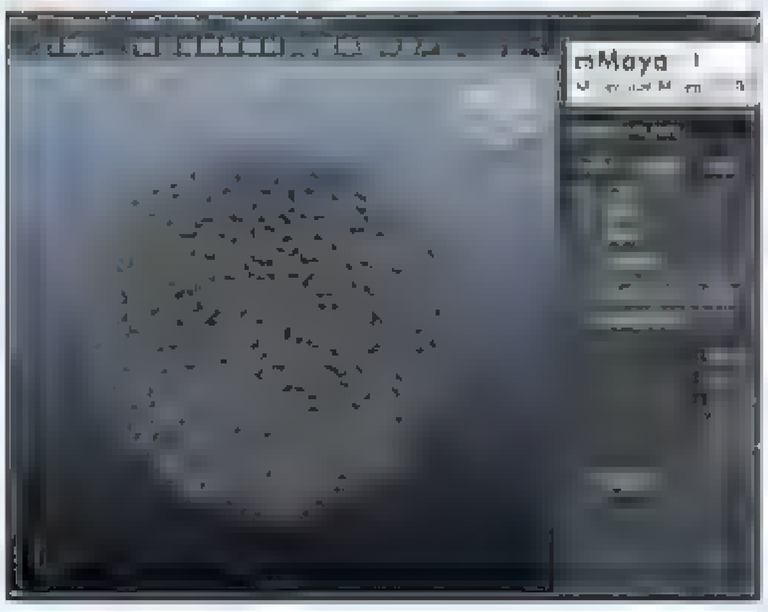


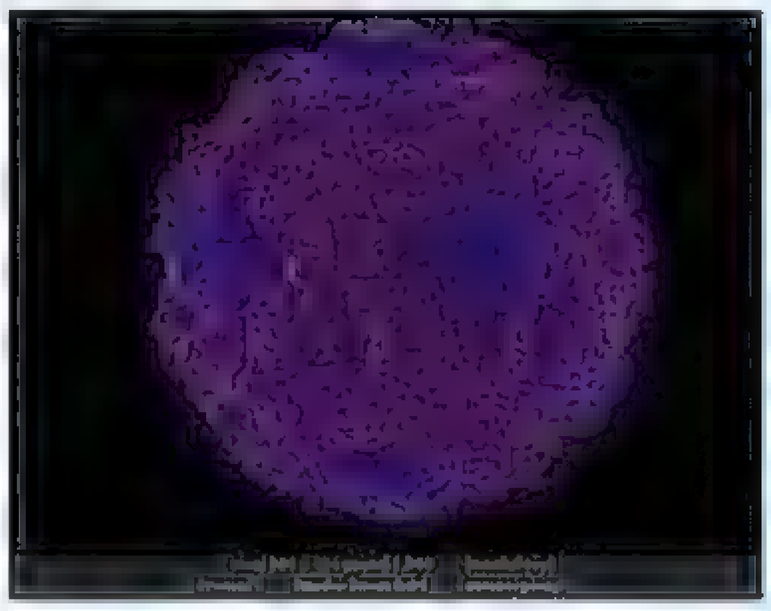
14 Import custom shaders

Open the Hypershade via Window > Rendering Editors > Hypershade. In the Hypershade, choose File > Import, then select shader1.ma from this tutorial's project files: it's in the mMaya project under renderData / Shaders. The shader is a mental ray architectural material (mia) network designed to look like electron microscope style shading. Import shader2.ma as well.

15 Prepare the mesh

In the mMaya interface, click Toggle CPV Display in the Ambient Occlusion Color Per Vertex (CPV) Bake rollout to turn off the shading that's been baked to the mesh. In the Biological Units rollout, set Toggling Off to Deletes Units. Turn off the Meshes option to hide the duplicated parts of the virus.





19 Add a light

In Maya's main menu bar, select Create > Lights > Directional Light. Select directionalLight1 in the Outliner and use the Move tool move it away from the centre of the virus. Use the Scale tool to scale it up so that you can see it more easily. Use Rotate to point the light at the virus.

20 Make a test render

Select Window > Rendering Editors > Render Settings. Set Render Using to mental ray. In the Common tab's Image Size rollout, set Width to 800 and Height to 450. In the Quality tab, set Quality Preset to Production. Turn on the Resolution Gate and frame the virus using the Perspective camera. Create a test render to see how the virus looks.

STAGE SEVEN

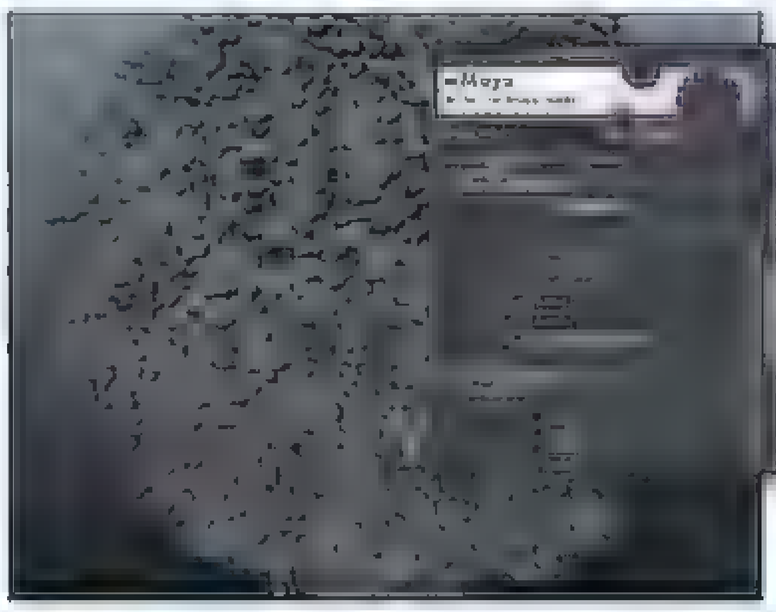
Create a ribbon backbone

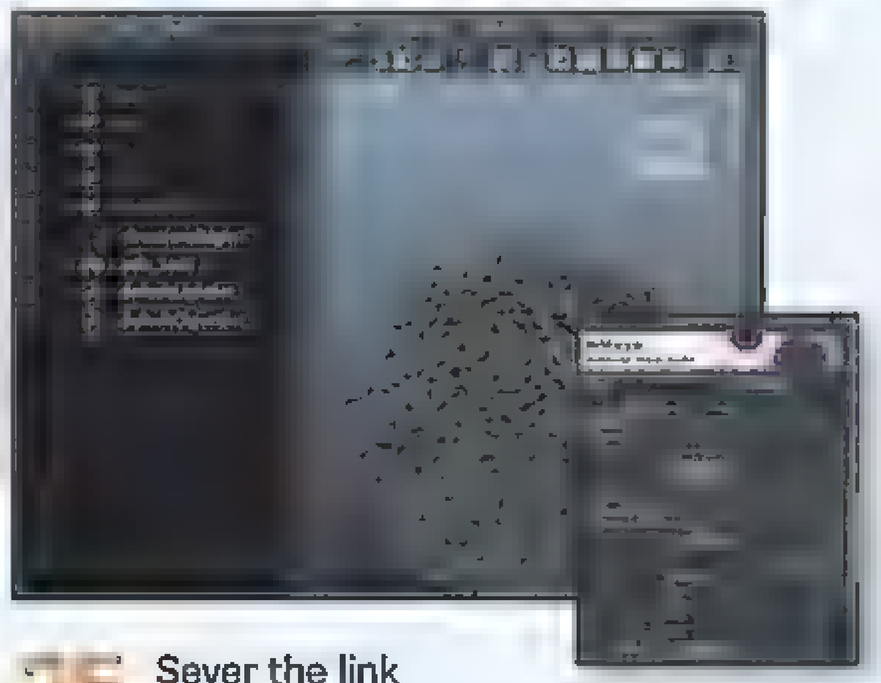
mMaya enables you to switch between different ways of displaying the atomic structure of your virus. The mesh created in the previous sections might work well for an animation showing the virus invading bacteria; but let's suppose that in your TV show, the director wants a scene where a scientist explains how the virus works to our intrepid heroes by displaying it on a computer screen. In this case, a ribbon backbone might be more appropriate than the mesh version. It's easy to create a ribbon backbone using mMaya.

STAGE EIGHT

Prepare for animation

You may want to animate the virus flying around and interacting with other objects – invading a bacterium, for example. At the moment, the structure display is controlled via the mMaya interface. A special node called pdb_1cd3 (indicated by a little molecule icon) appears in the Outliner. Because of the connection to this node, the viral structure is difficult to animate. To rig and animate the virus, you need to break the connection between the structure and the pdb node. But first, make sure the virus appears the way you want it to in the animation. Once you break the connection, you can no longer edit the structure using the mMaya controls.



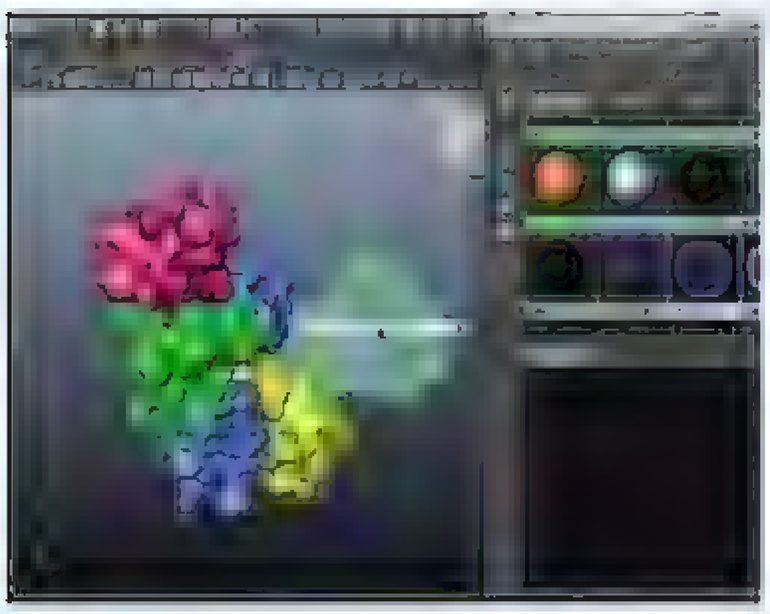


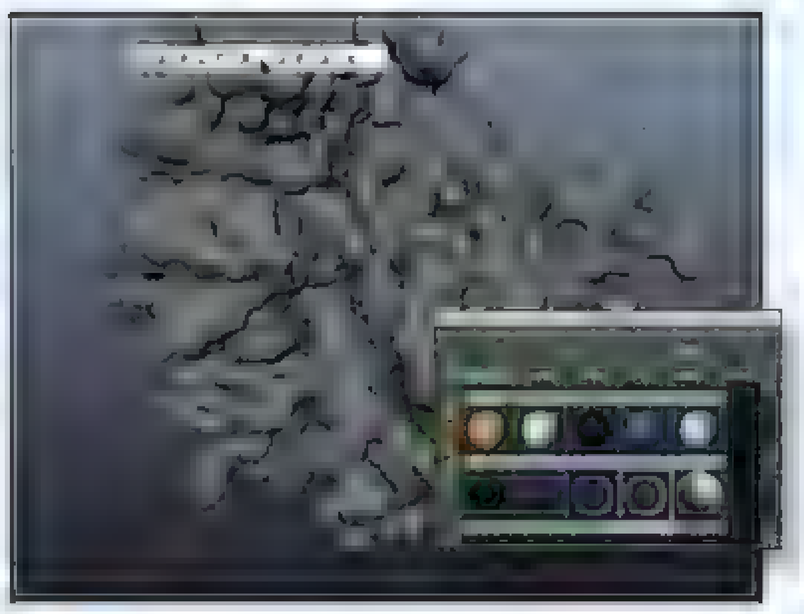
24 Adjust the display

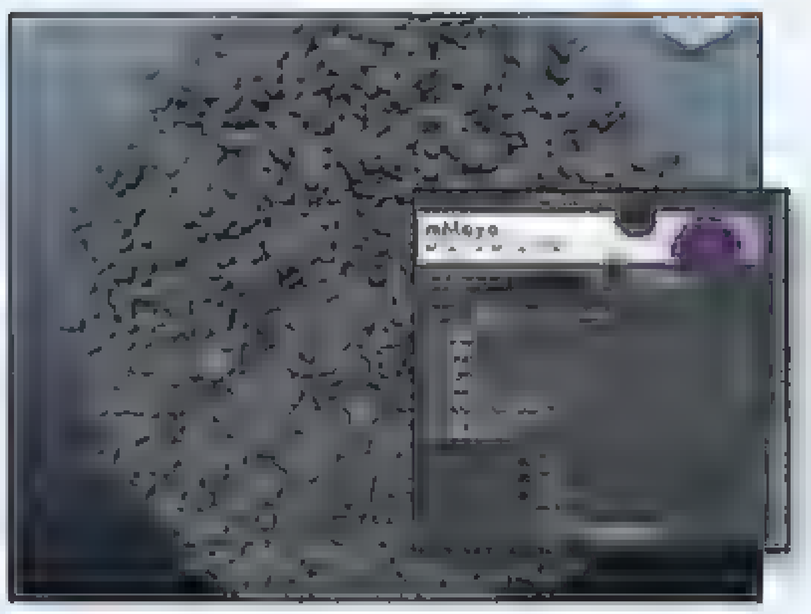
Under Biological Unit, turn Backbones off and Meshing on. In the Alpha-Carbon Backbone rollout, turn off Backbone Vis and Caps Vis. Under Meshing, turn Mesh Vis on. It's probably a good idea to save the scene as a separate file so you come back and edit it later on.

25 Sever the link

Under Global Settings, click the Sever from mMaya button. This breaks the connection to mMaya and places the structure in a group named pdb_1cd3. You can now animate the group node flying about the scene. Each part of the virus is contained in a sub-group.







16 Select a fragment

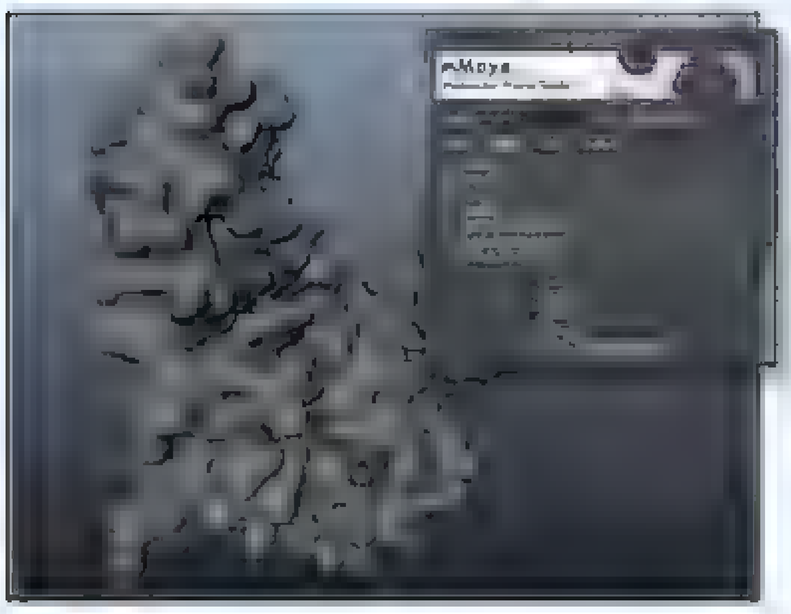
In the scene, select the part of the mesh that sticks out furthest on the X axis. Open the Hypershade and middle-mouse-drag shader1 on top of the selected part of the mesh. It will turn black. That's OK: Maya doesn't always display complex mental ray shaders correctly in the viewport.

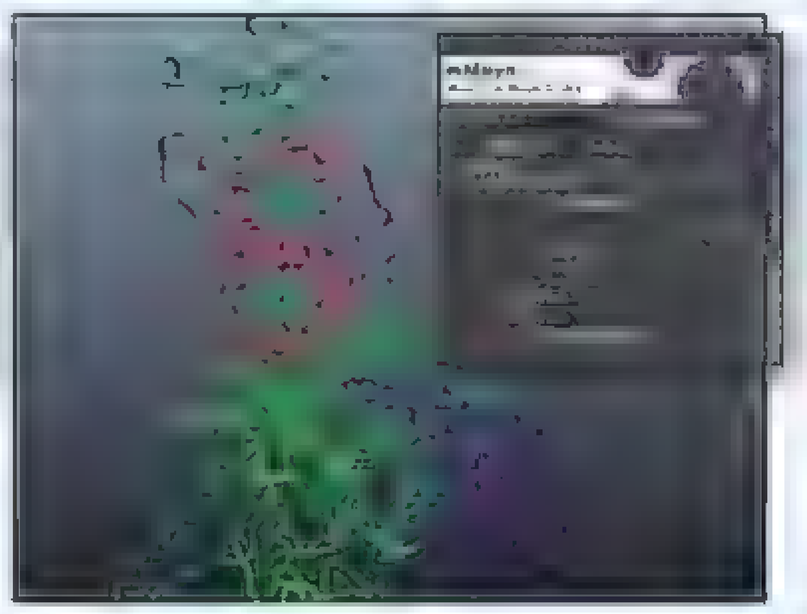
17 Apply the shader

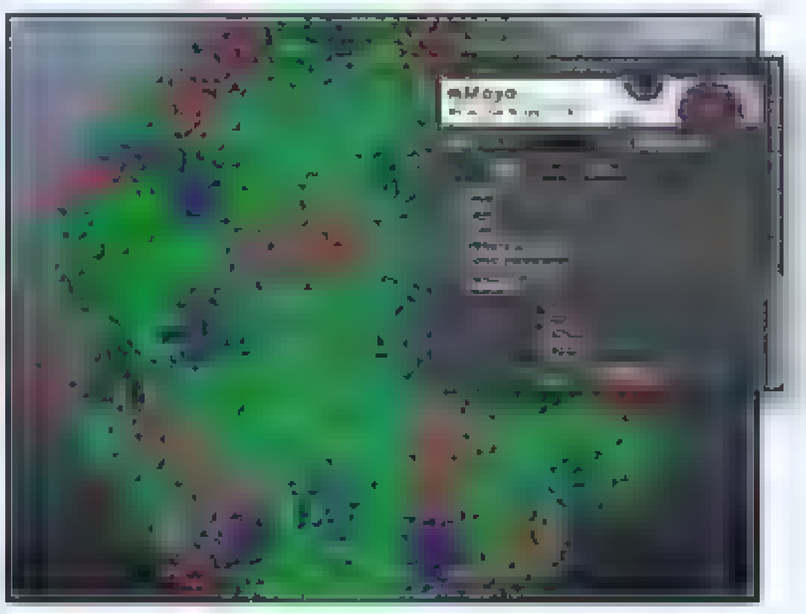
Use the same technique to apply shader2 to the other parts of the mesh. In the viewport menu bar, select Shading > Use Default Material so that you can see the virus a little better.

18 Restore the whole structure

Now that you have custom shaders applied, you can render the virus in mental ray using basic lighting. In the mMaya interface, scroll down to the Biologica. Unit rollout and turn on the Meshes display to bring back the whole structure.







21 Focus on the sub-unit

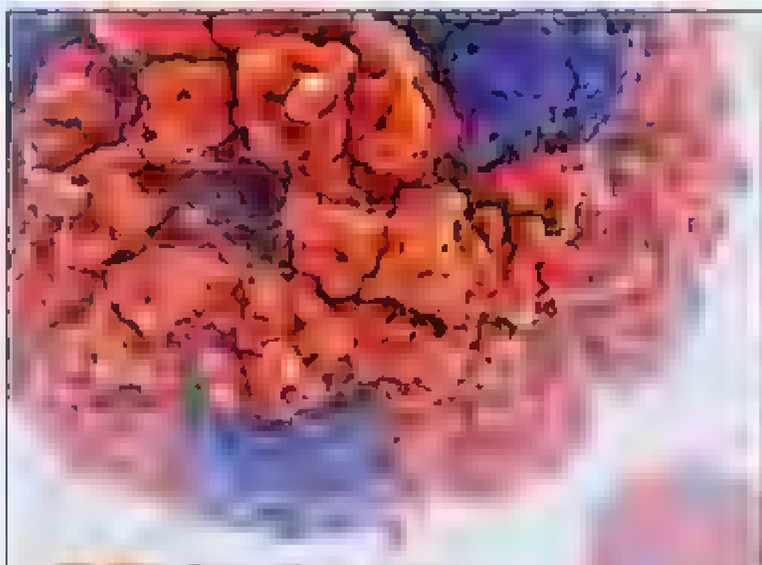
Under the Biological Unit rollout in mMaya, turn off Meshes. Zoom the view so that you can clearly see the visible sub-unit. Under the Meshing rollout, turn off the Mesh Vis option so that the mesh is hidden. In the viewport menu bar, turn off Shading > Use Default Material.

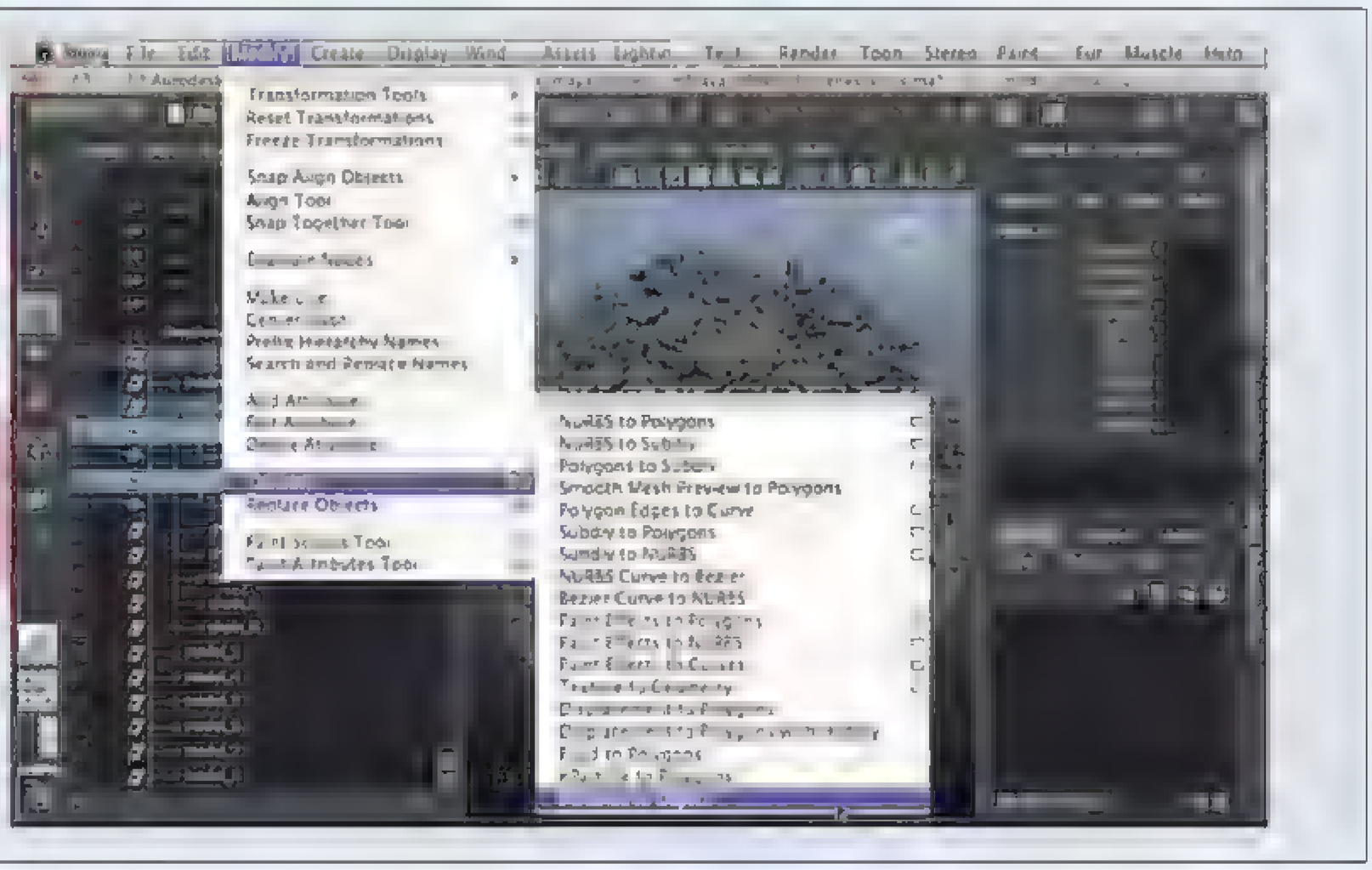
22 View the curves

Scroll down to the Alpha Carbon Backbone rollout and turn on Backbone Vis. The tubes that appear represent the main backbone structure of the viral sub-unit. Turn on Caps Vis to add rounded ends to each of the tubes. The Wire Trace Vis option enables you to see the curves used to create the extruded tubes.

23 View the whole structure

Adjust Tube Width and Tube Fit to smooth the display of the tubes and create a tighter fit around the backbone of the structure. The Display Res Preset buttons set the quality in the Maya viewport. To display the rest of the virus, scroll down to the Biological Unit rollout and activate Backbones. Zoom out to see the entire virus. If the performance seems slow, set Display Res to Low.




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Duplicate Special
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Separate
Extract
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Edit Clip
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Edit Character Group Node
Delete Character Group Node

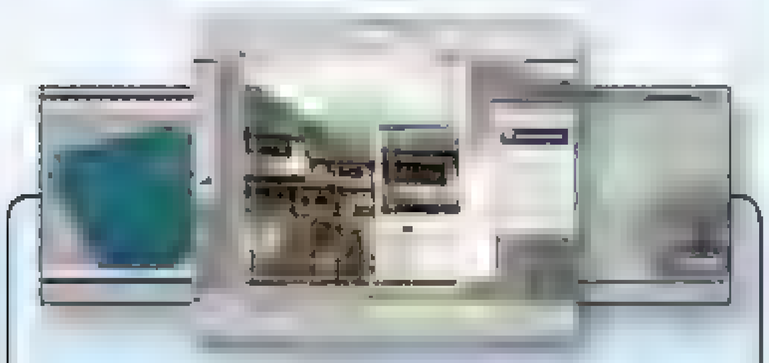
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LightWave

"How can I give my 3D model a '3D 8-bit' look?"

Dan, via email

The 3D 8-bit style, an updating of the pixelated look inspired by old videogames, is fairly common across the worlds of ads, games and design these days, but the techniques used to achieve this look can still prove to be a little tricky and cumbersome if you don't have a more automated method in your toolkit. This technique details a method for converting an object from one cohesive piece to a grouping of smaller cubes, all aligned to the shape of your model.

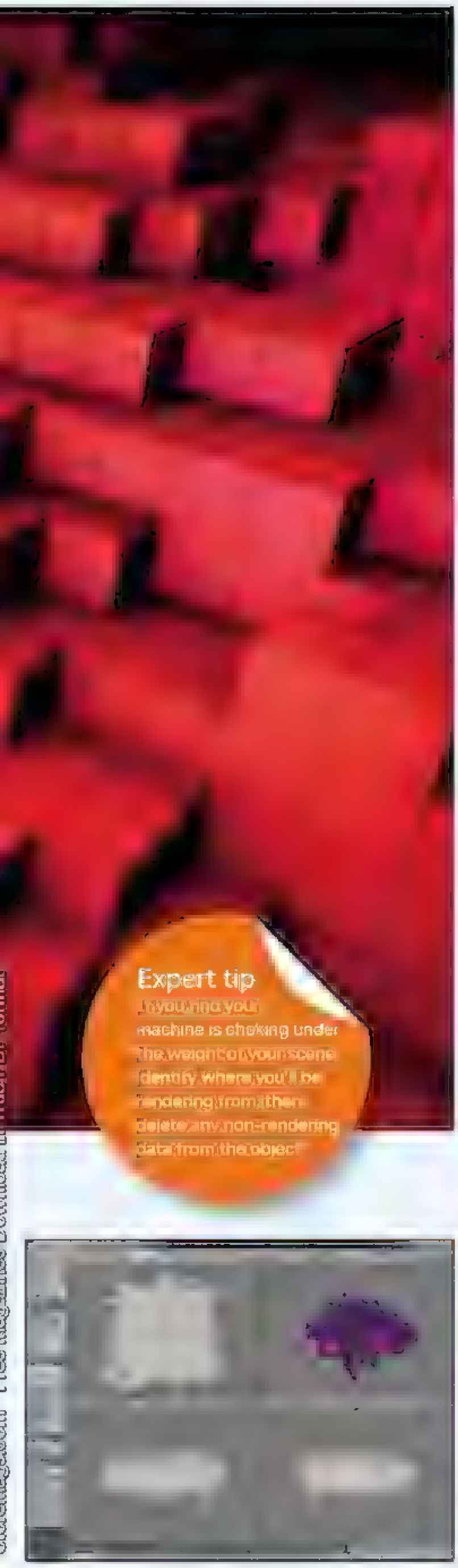
Begin by selecting or creating the model you wish to convert into a cube sculpture, and transform it as necessary. Keep in mind that only the larger details of your object will be represented as you 'de-rez' it. Via the Multiply tab, either freeze your object if it's subpatch, or subdivide your polygonal model twice. The goal is to end up with a dense mesh from which to gather your point cloud data.

Accounting for your model's scale, you'll align all your points to an invisible grid. Select Modify tab > Transform > More > Quantize, and set the distance to the size you'd like each cube to be. Note these values before you click OK. Press [K] to kill all polygons, then merge all points by pressing [M], so that you don't accidentally clone boxes on top of boxes.

In a new layer, select Create > Primitives > Box, then press [N] for Numeric. In the Numeric window, give the cube the same dimensions you gave the points when you quantised them. Take this time to perform any modifications to the block that would fit your scene. Keep in mind as well that UV mapping should be done before cloning if you want specific features across each block.

With your point cloud in the background and your box in the foreground, select Multiply tab > Duplicate section > More > Particle Clone. The nearby option Point Clone Plus is recommended for more organic structures: you can change values subtly to lend some randomness to a potentially rigid, boxy style.

Don't forget to merge your points one last time; then select Detail tab > Polygons > More > Unify Polys. This will optimise your model and make sure no render errors will occur from overlapping polygons.



Quantising the points of your model usually produces a pretty mangled mesh, but this is inconsequential: the point data you extract is what you're after in this process

Eric Bacus is a CG artist at Branit VFX. His resume includes many primetime shows, notably Lost, Pushing Daisies and Breaking Bad
ericbacus.com

After Effects

"How can I create a stream of arrows that follow a path?"

James Frost, via email

Andy Davenport replies:

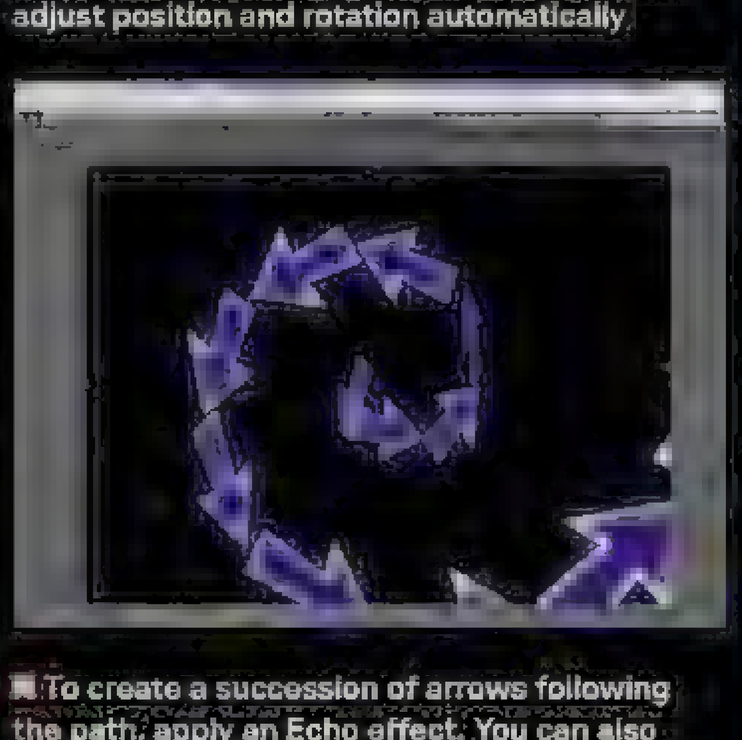
As a motion graphics artist, it's highly likely that you'll be called on to animate a stream of arrows or objects at some point. Luckily, After Effects has all the tools needed to make it quick, easy and adaptable. Start by opening Arrows_Start.aep from the project files, then select Shape Layer 1.

To save time, I've made a start by using the Pen Tool to draw an arrow shape. Finish it off by going to the Shape Layers options in the top toolbar. Click Fill to open Fill Options, then click the Solid Color icon and press OK. Click the colour swatch next to Fill and change Shape Fill Color to R 11, G 35, B 68, then click OK. Repeat the process for Stroke, but change Shape Stroke Color to R 99, G 118, B 145. Change the stroke width to 10px. In the Composition area, click Shape Layer 1's 3D Layer checkbox (the column with a cube icon) to make it a 3D layer.

Select the Null 1 layer and press [P] to open its Position properties. Again to save time, I've already created an animation path for you to use. Click the Position label to select all the keyframes, then press [Ctrl]+[C] to copy them. Select Shape Layer 1's Position properties, then press [Ctrl]+[V] to paste the keyframes.

To make the arrow follow the path, select Layer > Transform > Auto Orient. Change Auto-Orientation to Orient Along Path and press OK. Now you just need to align the arrow in the correct initial direction: press [R] and change Y Rotation to 0x -91°.

In the Project window, select the Arrow composition and drag it onto the Create a new Composition icon. In the new comp, select the Arrow layer and add Effect > Time > Echo. In the Effect Controls tab, change Echo Time (seconds) to -0.333, Number of Echoes to 20 and Echo Operator to Composite in Front. Finish the effect by adding Effect > Stylize > Glow. Change Glow Threshold to 26.0% and Glow Radius to 31.



Once you have created your path, use the Auto-Orientation dialog to ensure your arrows adjust position and rotation automatically

To create a succession of arrows following the path, apply an Echo effect. You can also tweak the arrow style with a Glow effect

Andy Davenport is a motion graphics artist, 3D animator and compositor for UK based studio Mediastation
mediastation.co.uk



3ds Max

"How can I achieve a Tron-style render?"

Robert Fribber, from the forums

Michael McCarthy replies:

Since Tron: Legacy hit the big screen, many artists have been looking to duplicate its look of a dark reflective material with glowing stripes running through. You might be tempted to dive right into the material set-up, but for any reflective or refractive material situation, it's important to have an interesting model and environment so the material can effectively do its job. In the film, you can see that most of the objects have detailed bevels and edges, while the environment is dark, but with many variations to reflect.

Open LightHelmetStart_2010.max from this Q&A's scene files. You'll find a simple helmet object; it's not a full-on light cycle, but should have enough detail for some interesting reflections. The scene also has a basic gradient environment background that will be interesting to reflect. The background has been set up with a Gradient Ramp map in the Environment slot. The model also has three Material IDs set up for the reflective helmet, glass and glowing stripes.

Apply a new Multi/Sub-Object material to the helmet and set Number of Materials to 3. In each material's slot, change the Standard materials to Arch & Design materials. Set the Diffuse color of all the materials to black. For the helmet's paint components, set Reflectivity to 1.0; for its glass, set Transparency to 1.0. This should give you some interesting reflections and refractions in the render.

Next, you'll add the lit stripes. Open the Self Illumination (Glow) rollout for the stripe material. Enable Self Illumination (Glow) and adjust the colour to a light but saturated blue. This will light up the stripes: you should be able to see them in the reflections of the helmet. Enable Illuminates the Scene so that the light stripes will illuminate with Final Gather.

Your render should be looking pretty good, but you need to add a slight glow. Try using mental ray's Glare shader: open the Render Settings dialog and go to the Renderer tab. In the Camera Effects rollout, tick the Output option. In the output slot, you can see that the Glare shader is applied by default; this takes bright lights and materials like the stripe material and makes them glow. Shoot off a render – you should now have a nice reflective glassy black material with glowing stripes.

Expert tip

Adjusting the Luminance of the stripe material makes it glow more. To compensate, drag the Glare shader into the Material Editor as an instance.

Here are the settings for the glowing stripe material. Setting the Self Illumination options is the first step to getting a glowing material

Here are the settings for the renderer in order to apply the Glare shader as a post effect

Michael McCarthy is a 3D artist working in broadcast, feature film, and games. He's also an Autodesk Certified Instructor

mmccarthy.com

Maya

"How can I extract foam data from the ocean shader?"

Daniel McCall, via email

Firat Enderoglu replies:

Maya's ocean shader is a powerful procedural texture that gives you many options for customising waves' look and behaviour. Along with the shader, there are some great related utilities, which you can find under Dynamics menu set > Fluid Effects. For the differences between Ocean and Pond in this menu, I recommend checking the documentation: there are great examples on which set-up to use, and when.

Most of the tools you'll find under the Ocean sub-menu are there as quick shortcuts within your workflow. If you'd like, you can create an ocean scene without using this sub-menu at all, but I'd suggest getting familiar with the options here and what they do, to understand how different parts of the set-up are connected to each other. You can use Create Ocean to get a big planar surface with more detail at the centre, and an ocean shader already applied. The Preview Plane is a great little helper for seeing the results of your modifications without having to render your scene.

Now that you have a basic ocean plane set-up, select it then choose Fluid Effects > Ocean > Create Wake. Animate it so you can see the result more clearly, and make sure to scale the foam texture box to include the area you're animating, otherwise you won't see any wake or foam.

You should now have a scene where your wake emitter is creating a nice foam. Play around with the ocean shader's settings to get the look you want. To have more control over the foam – if you want to render a separate pass for it, for example – you'll want a separate shader just for the foam. Luckily, the

Blender

"How can I make an animated flame with materials in Blender?"

Mark Somerville, via email

Bassam Kurdali replies

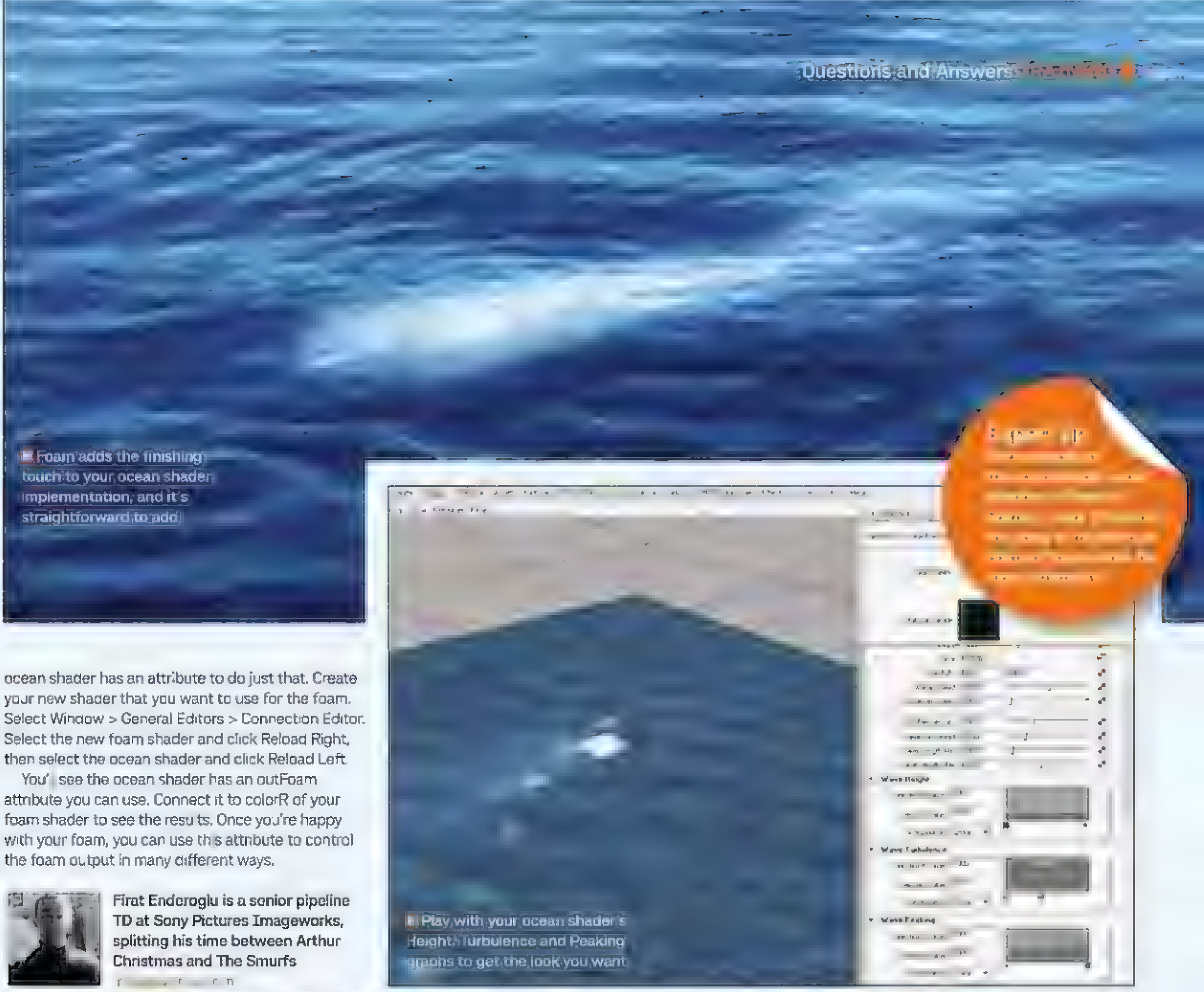
There is a reasonably easy solution to this. Applying a couple of animated procedural materials to a pair of simple UV Spheres gets you most of the way there.

Before continuing, follow the first 50 seconds of the screen-capture video accompanying this Q&A to set up the basic elements you'll need in the scene. After creating a new scene and deleting the default cube, you'll create a UV Sphere named Centerball, a second UV Sphere named EnergyFlame and an Empty named Texmap.



Bassam Kurdali is the director of the Blender-based short Elephants Dream. He's currently working on a new short, Tube

tube.freefac.org

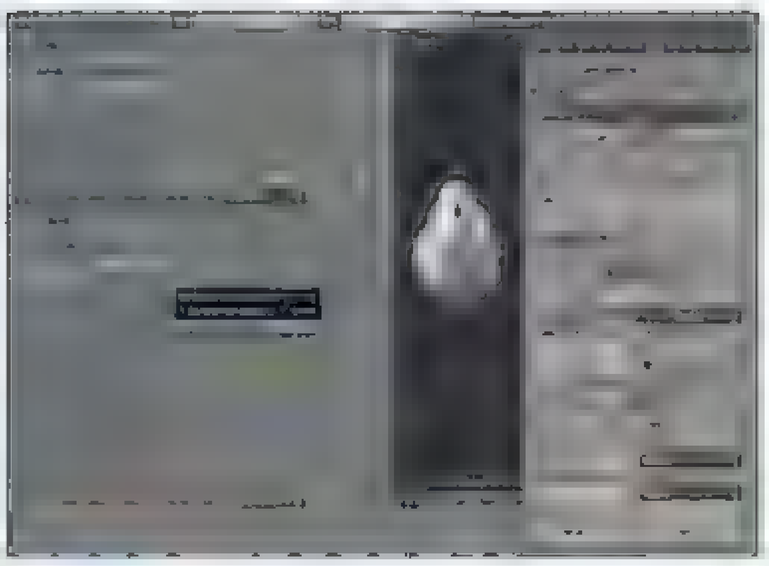


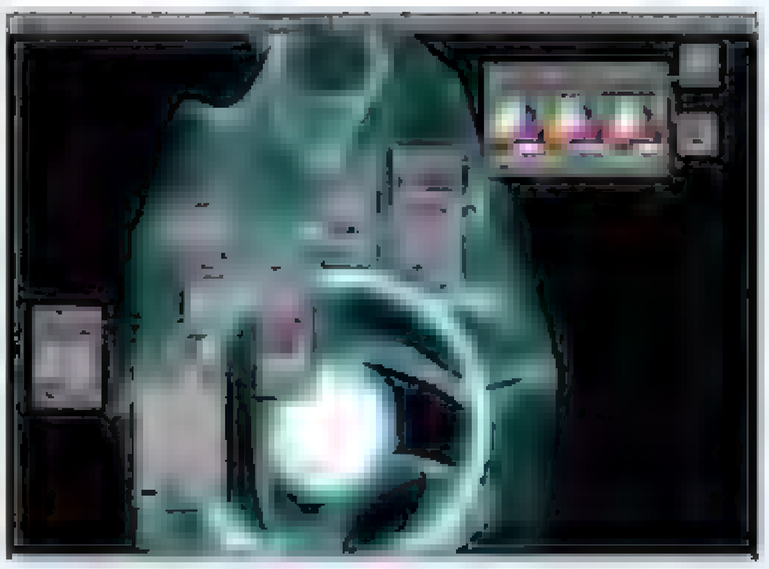
ocean shader has an attribute to do just that. Create your new shader that you want to use for the foam. Select Window > General Editors > Connection Editor. Select the new foam shader and click Reload Right, then select the ocean shader and click Reload Left.

You'll see the ocean shader has an outFoam attribute you can use. Connect it to colorR of your foam shader to see the results. Once you're happy with your foam, you can use this attribute to control the foam output in many different ways.

Firat Enderoglu is a senior pipeline TD at Sony Pictures Imageworks, splitting his time between Arthur Christmas and The Smurfs







01 Materials and textures

Select the Centerball object. In Material Properties, add a material. Match it to Material.001 in the screenshot. (A larger version is on the disc.) In Texture Properties, add a texture – follow the video from 1:07 for the settings. Select EnergyFlame and match the screenshot's Material.002 settings. In the Texture Properties, add a Clouds Texture; set Noise to Hard, Size to 0.80 and Depth to 0. Apply a Ramp with a tiny bar of white, then cyan, followed by transparency on the right. Change Mapping Coordinates to Object and pick Texmap as the object. Under Influence, enable Density, Emission, Scattering and Emission Color. Click the second texture slot, browse and select Texture.001.

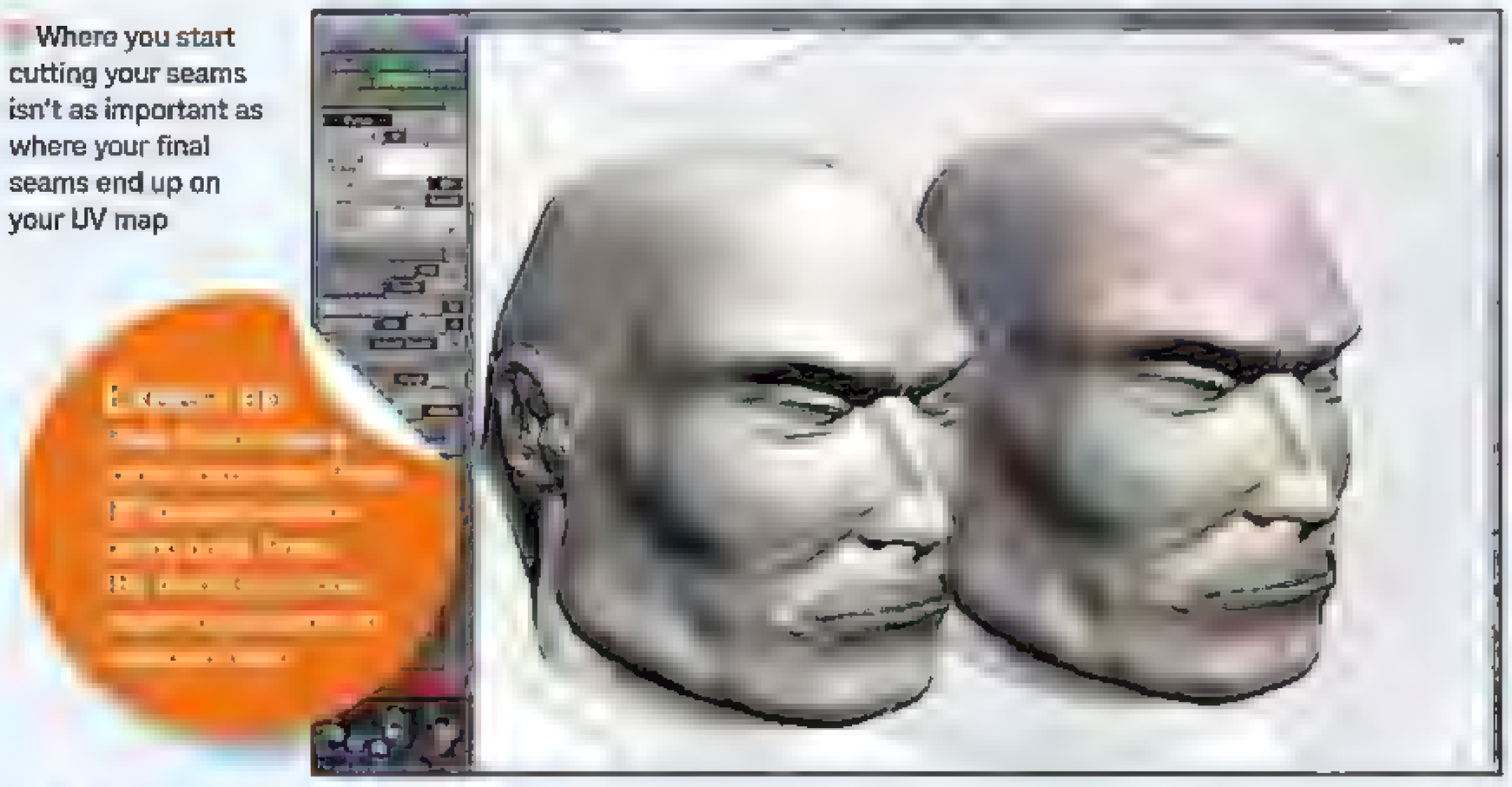
02 Modifers and animation

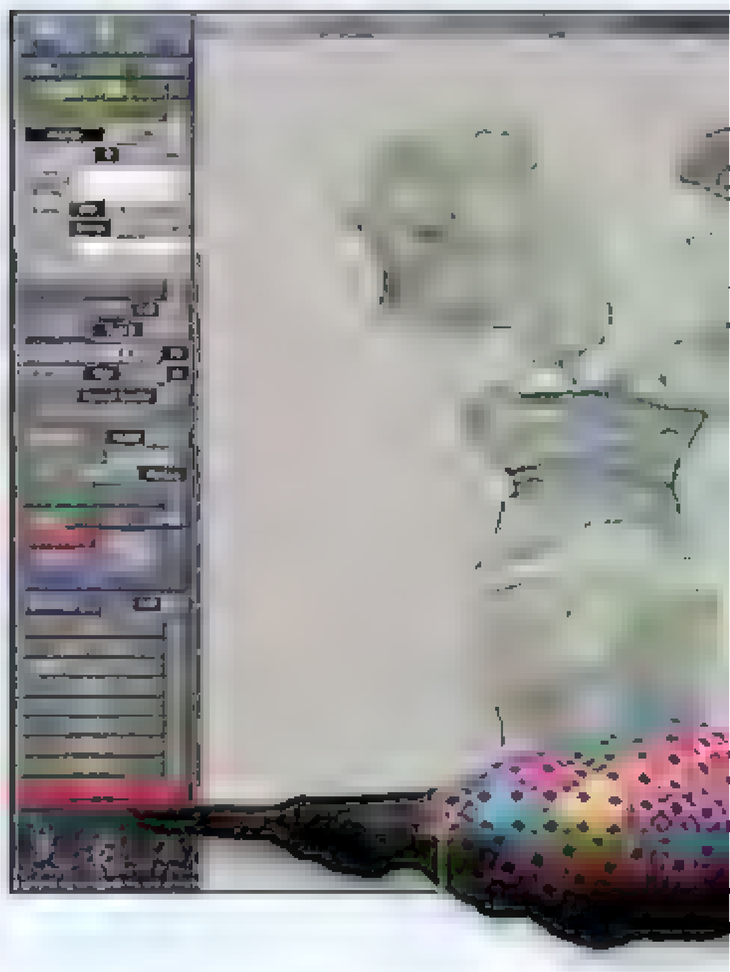
Next, click the 2 button to make a copy of the texture, disable the Ramp and change Noise back to Soft. Untick its checkbox in the Texture list. Select the Centerball object and add a Subdivision Surface modifier in Modifiers Properties. Select EnergyFlame, and press [Tab] to edit. Scale everything up by pressing [S] and moving the mouse; click to confirm. Right-click the top centre vertex, press [Ctrl]+[H] and select Hook to New Object. Press [Ctrl]+[Numpad +] repeatedly to expand the selection to half the sphere, then click Assign in the Hook modifier. Change Falloff to about 1.3, then press [Tab]. Add a Subdivision Surface followed by a Displace modifier. Set them both as shown in the screenshot.

03 Compositing

Select and move the Hook Empty up, to give the flames a teardrop shape. Select Texmap, then press [I] and key Location. In the timeline, go to frame 35. Move Texmap up by 4 units in Z and key. Select the Animation layout, press [Shift]+[E] and choose Linear Extrapolation. Effects like this need a little glow to add oomph to them. Press [Shift]+[F3] in any area to show the Node Editor, click Compositing Nodes, then enable Use Nodes and Backdrop. [Ctrl]-clicking on a node lets you preview its output. Add the following nodes: Color > RGB Curves; two of Filter > Blur; Color > Mix; Filter > Glare, Color > Color Balance; and Output > Viewer. Connect them and set their values as shown.

Where you start cutting your seams isn't as important as where your final seams end up on your UV map





UVLayout

"Where should I cut seams for character meshes?"

Nisstany, from the forums

Cirstyn Bech-Yagher replies

Where to start cutting seams is probably the most commonly asked question by beginners to UV mapping. As a UV map's function is to provide flattened, well-laid-out and easy-to-texture mesh topology, where you start is actually of less importance than where your final seams end up, especially on a dense, non-symmetrical mesh. You may want to start out old-school if you're working on one of these – cutting and flattening your unwrapping shells or seams first, then refining, welding and reassembling your shells into a final map for texturing.

Using UVLayout, let's cut unwrapping and welding seams and shells for a figure. Load LesGarnersBehemoth.obj from the scene files' Assets folder. Cut it into six parts: left and right legs, left and right arms, torso and head. Do this by clicking on your figure to select it, moving your cursor over a polygon edge on each of the body parts mentioned, and cutting a seam by moving along the selected edge loop, continuously pressing [C] as you go. Press [Shift]+[S] to finish.

After you've cut the main shells, refine the cuts on the shells to make unwrapping and welding easier. For the head, cut seams for mouth, ears and inner nostrils, then cut a vertical seam through the middle of the head, around the face itself and under the chin. This makes it easier to flatten the face, and to weld it together again. For the body, rotate your mesh so the back is facing you, then cut a vertical seam on the torso, and horizontal ones on the back of the torso, arms and legs, as shown in the video. Refine these cuts if needed. Also cut seams for the hands and feet.

Even if you don't have a straight set of edges to follow, try to stick as much to the middle of the shell – it's easier to orient yourself on the mesh and to keep track of seams.

Press [Shift]+[S] when you've finished. Drop each part in turn into the UV View by clicking it and pressing [D]. Referring to the video, unwrap each part by pressing [Shift]+[F] or [Shift]+[B] and Optimize. Weld them into an easier-to-texture map by pressing [W] and [Enter]. Tweak the flattening with Pin or Brush.

The Behemoth model is provided courtesy of Les Garner (**slxus1.com**).



Cirstyn Bech-Yagher is a 3D freelancer and is currently working on a series of tutorials aimed at newcomers to 3D

Photoshop

"How can I give my render an old-school Technicolor look?"

Ryan Haas, via email

Richard Tilbury replies

There's no set formula for creating this familiar saturated or two-tone look: individual colour and lighting schemes always dictate the modifications to some degree. But with careful variation, these techniques can achieve the desired result. Try them out with start.jpg in the scene files. Create adjustment layers via Layer > New Adjustment Layer.



Richard Tilbury is the resident artist at 3D Total, as well as working freelance as a concept artist and illustrator





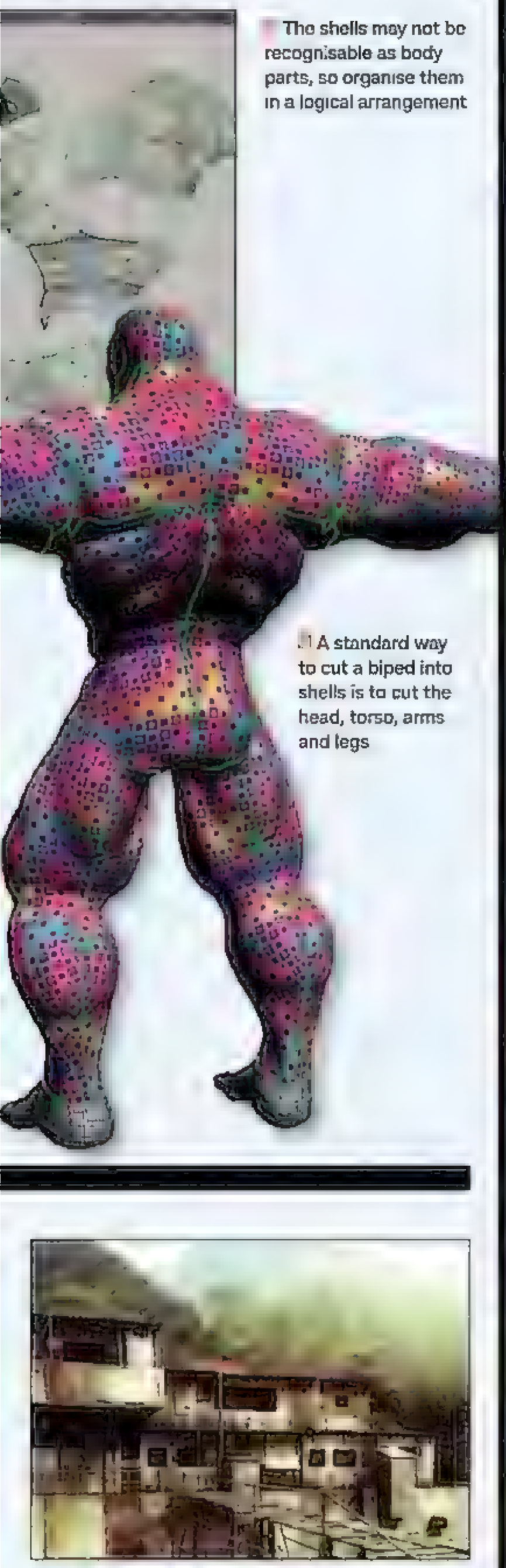
01 Get the basic look

Create a Channel Mixer adjustment layer. Enable then disable Monochrome. Make Output Channel Red, Red +100, Green 0 and Blue 0. Apply a Hue/Saturation adjustment layer; make Hue +23, Saturation +27 and Lightness +2. Duplicate the base render to the top layer. Select Image > Adjustments > Photo Filter. Set Filter to Underwater and Density to 60%. Double-click the top layer's thumbnail; under Blend If, drag the left This Layer marker to 122 and the left Underlying Layer marker to 117.

02 Refine the style

Duplicate the base render again and move it to the top of the layer stack. Select Image > Adjustments > Color Balance and drag the top slider to Red +33. Via the same menu, choose Hue/Saturation; reduce Saturation to -8. Now apply a layer mask to this layer. Make the foreground colour black. Apply a Foreground to Transparent Gradient to the mask by dragging from the top of the frame to just below halfway down, using the Gradient Tool. Set the layer's blending mode to Darken at 40% Opacity.

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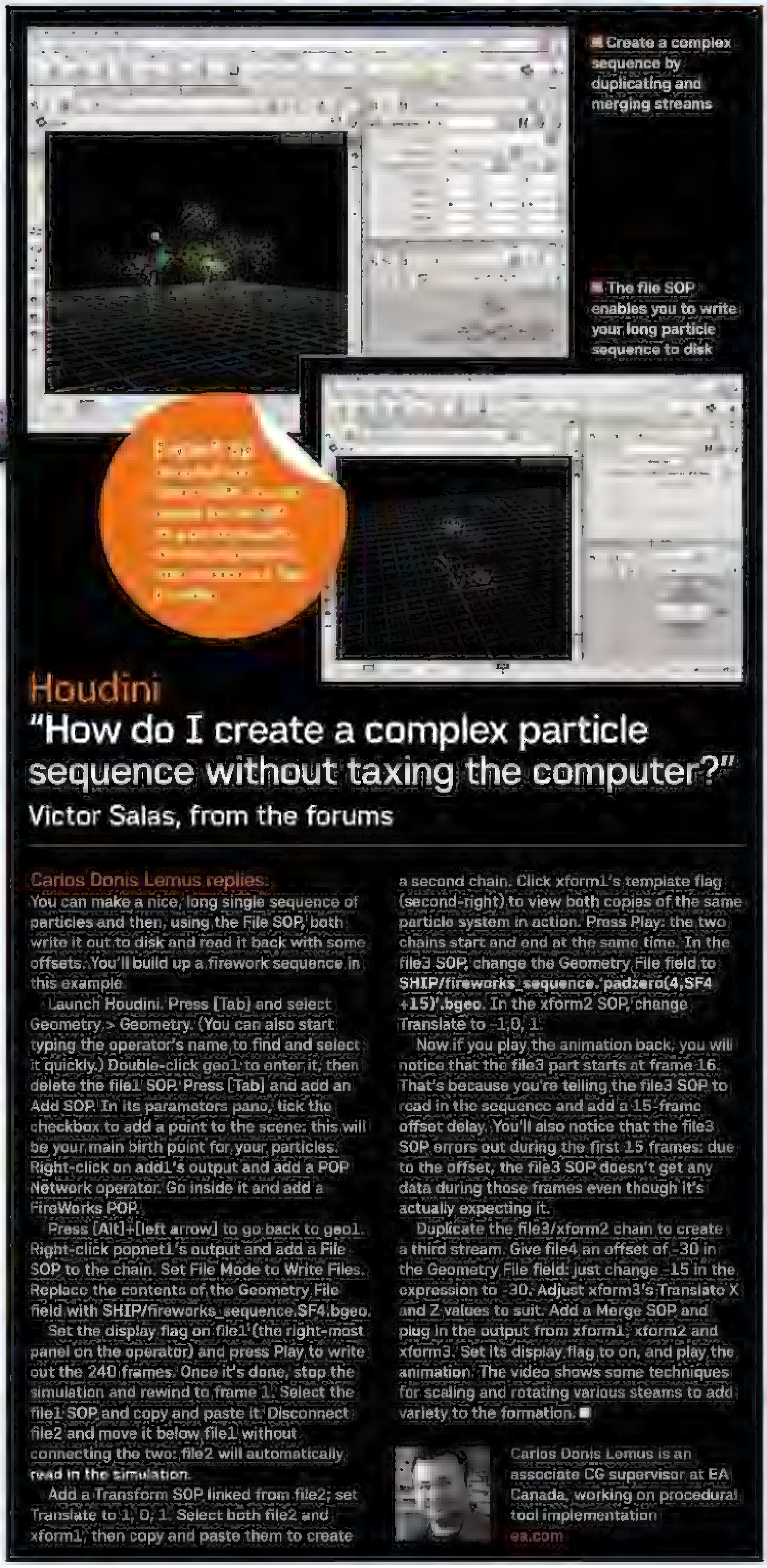


The shells may not be recognisable as body parts, so organise them in a logical arrangement

A standard way to cut a biped into shells is to cut the head, torso, arms and legs

03 Finishing touches

Apply a Hue/Saturation Adjustment Layer, with Hue and Saturation both set to –11. Apply a Photo Filter Adjustment Layer. Set Filter to Warming Filter (85) and Density to 51%. In the layer mask, apply a similar gradient to before, using black again. This removes the filter from the background. Change the blending mode to Color at 60% Opacity. If you wish, apply a vignette or some Film Grain or Noise for extra effect.



Houdini

"How do I create a complex particle sequence without taxing the computer?"

Victor Salas, from the forums

Carlos Donis Lemus replies:

You can make a nice, long single sequence of particles and then, using the File SOP, both write it out to disk and read it back with some offsets. You'll build up a firework sequence in this example.

Launch Houdini. Press [Tab] and select Geometry > Geometry. (You can also start typing the operator's name to find and select it quickly.) Double-click geo1 to enter it, then delete the file1 SOP. Press [Tab] and add an Add SOP. In its parameters pane, tick the checkbox to add a point to the scene: this will be your main birth point for your particles. Right-click on add1's output and add a POP Network operator. Go inside it and add a FireWorks POP.

Press [Alt]+[left arrow] to go back to geo1. Right-click popnet1's output and add a File SOP to the chain. Set File Mode to Write Files. Replace the contents of the Geometry File field with SHIP/fireworks_sequence.SF4.bgeo.

Set the display flag on file1 (the right-most panel on the operator) and press Play to write out the 240 frames. Once it's done, stop the simulation and rewind to frame 1. Select the file1 SOP and copy and paste it. Disconnect file2 and move it below file1 without connecting the two: file2 will automatically read in the simulation.

Add a Transform SOP linked from file2; set Translate to 1, 0, 1. Select both file2 and xform1, then copy and paste them to create a second chain. Click xform1's template flag (second-right) to view both copies of the same particle system in action. Press Play: the two chains start and end at the same time. In the file3 SOP, change the Geometry File field to **SHIP/fireworks_sequence.`padzero(4,SF4+15)`.bgeo**. In the xform2 SOP, change Translate to -1,0, 1.

Now if you play the animation back, you will notice that the file3 part starts at frame 16. That's because you're telling the file3 SOP to read in the sequence and add a 15-frame offset delay. You'll also notice that the file3 SOP errors out during the first 15 frames: due to the offset, the file3 SOP doesn't get any data during those frames even though it's actually expecting it.

Duplicate the file3/xform2 chain to create a third stream. Give file4 an offset of -30 in the Geometry File field: just change -15 in the expression to -30. Adjust xform3's Translate X and Z values to suit. Add a Merge SOP and plug in the output from xform1, xform2 and xform3. Set its display flag to on, and play the animation. The video shows some techniques for scaling and rotating various steams to add variety to the formation. ■

Carlos Donis Lemus is an associate CG supervisor at EA Canada, working on procedural tool implementation
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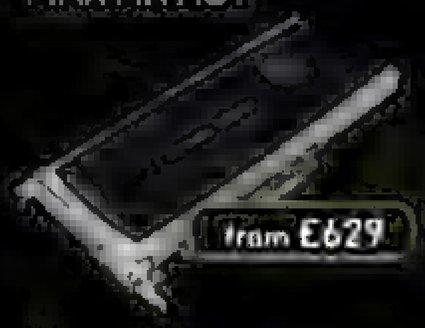
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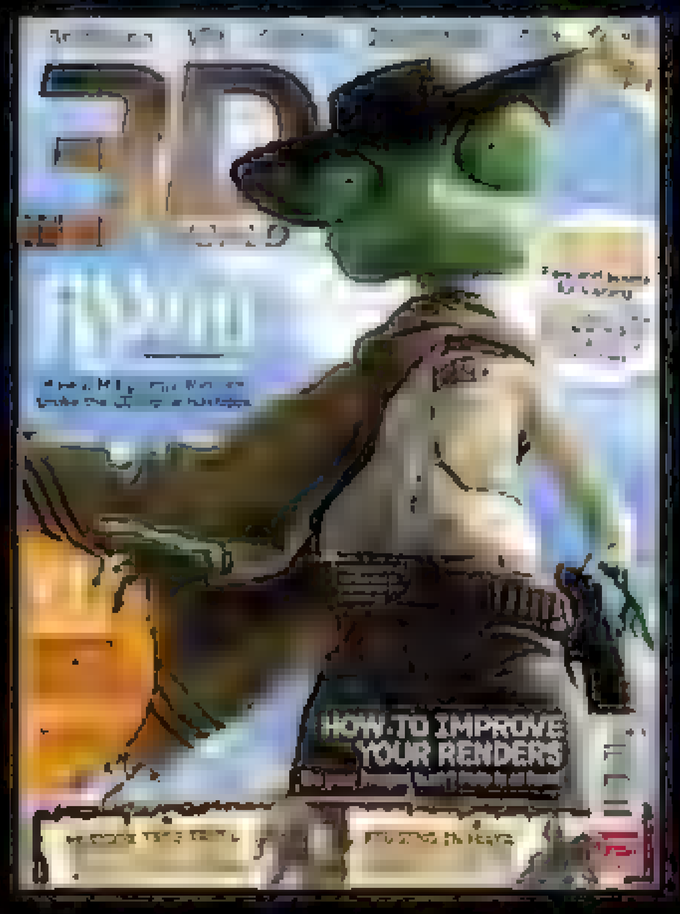
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IKinema for Maya

Developer IKinema brings a fresh face to full-body animation in Maya. Gary Marshall asks if it's a solver for all seasons

Developments in CG animation technology are rapid. Startup developers frequently purport to be bringing to market the next groundbreaking suite of software that will create movie-quality motion at the press of a few buttons. With such bold claims, it's important to see if such assertions stand up in the real world.

Guildford-based IKinema is one such startup. Armed with tech reportedly distilled from research into spacecraft control, it's developed a plug-in for Maya that boasts true full-body animation of any hierarchy, without the need to go through an intermediary rig or characterisation process (à la HumanIK). Coupled with this, a straightforward retargeting interface and real-time streaming from popular mocap packages makes for an impressive résumé. Not to leave game developers out in the cold, runtime implementations for consoles and the ability to add physics constraints to dynamically alter existing motion are also on offer.

A quick set-up process first creates an instance of the solver at the root of your hierarchy. Once populated, you can specify what IKinema calls tasks (essentially constraints), which drive a particular joint in position or orientation. For a generic biped, this would amount to position tasks at the hips, hands, feet, shoulders and neck base, plus an orientation on the head. The simple workflow is akin to setting up standard chain IK.

If desired, task nodes can be parented under primitive control objects of the kind one might find in a traditional rig. Tasks are manipulated in the viewport, and the solver determines the most believable pose over the full-body rig while satisfying these tasks.

The end result is of course tunable: you have the ability to set limits restricting movement on a given axis, and sliding an additional mobility attribute has the effect of stiffening the joint up or allowing for more flexibility. Tasks can also be assigned differing priorities: the solver will bias the posture to satisfy any tasks that you've awarded higher importance.

The benefits of this workflow are clear compared to traditional character set-up, which demands highly specialised skills to build complex rigs with myriad controls. Being able to work on unconventional hierarchies is a major advantage too.

IKINEMA IN USE

On loading the plug-in, you're shown a dedicated menu and persistent tool shelf. The icons aren't immediately intuitive, with several looking similar to each other. Even with repeated use, you may find you need the tooltips to jog your memory.



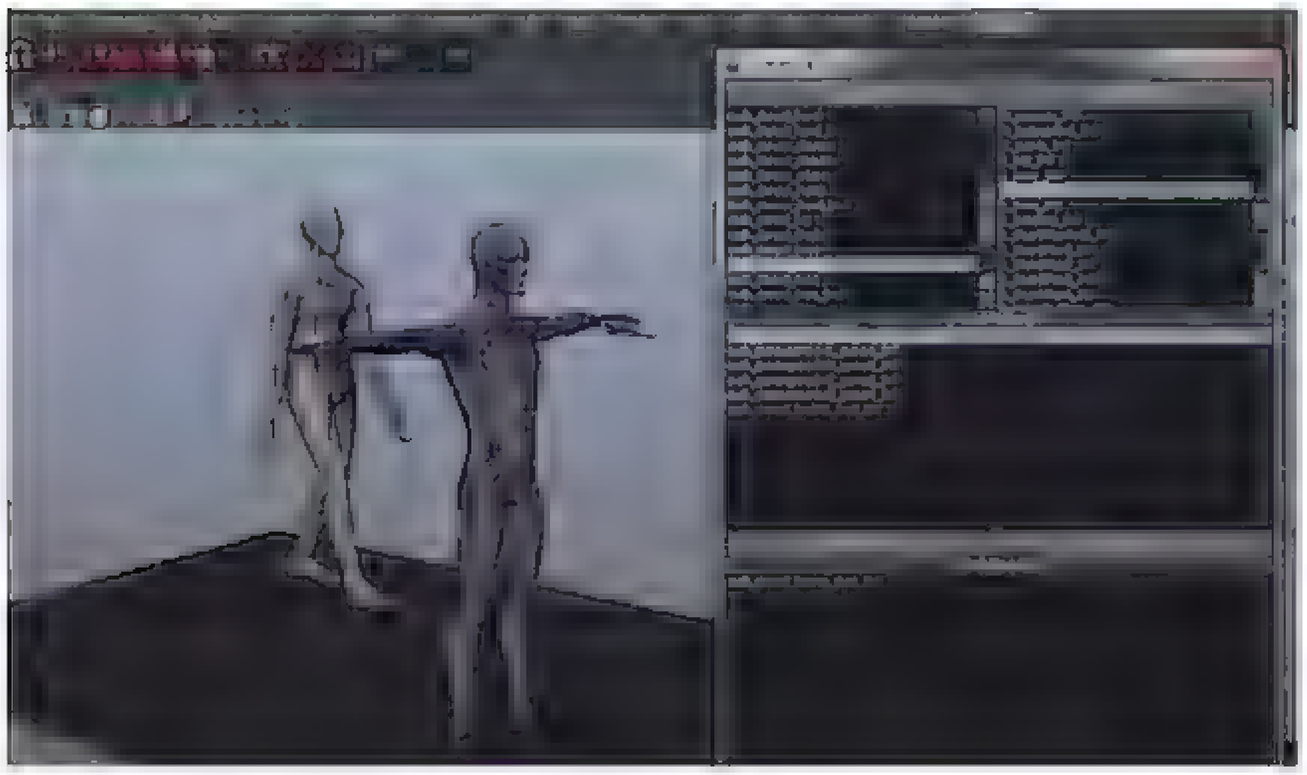
The solver can be applied to unconventional hierarchies, enabling you to animate a variety of characters



Gary Marshall is senior motion capture [illegible] Framestore London, currently working on Alfonso Cuarón's Gravity. He has spent the last seven years working on motion capture projects around the world for VFX, feature animation and games, from capturing and editing data to writing tools and building pipelines



Retargeting is easily setup with an intuitive mapping interface



Since most artists will likely be interested in straight-up full-body animation, let's use a simple biped with low spine resolution (two joints) as an example. Set-up is completed in seconds with a few clicks; slightly longer if you go to the trouble of making control objects. Once joint limits have been tuned via on-screen controls, the business of animating can begin. Simple animations can be knocked out fairly rapidly, achieving fluid, believable motion with little effort. Overall, the solver works well, and for those wanting to animate in FK you are given the option of duplicating the entire hierarchy (effectively setting up a 1:1 retarget) and using those joints to key FK rotations in addition to your IK. This works, although it's not as convenient as a true IK/FK switch in a good articulation rig.

With a more detailed skeleton, additional care is needed in setting up and tuning, and the solver is prone to less predictable behaviour. Selecting undo will not always guarantee a return to the exact space you had before moving your task, which can be quite frustrating. The solver model is currently non-deterministic, such that playing from frame 0 can give a slightly different result each time. Future development could perhaps address this with an additional solving mode.

If you have existing animation to retarget, this can be achieved through a basic interface for mapping source to target. While it will do its best to match bones based on namespace, it's fairly straightforward to script an automation with the supplied API. This also becomes necessary when working with a large data set, as there is no batch mode. Mapped tasks can have scale attributes tweaked to compensate for size discrepancies between characters, although it's generally worth globally scaling skeletons first to have the best shot at eliminating foot-skate relying on the attributes alone doesn't entirely solve the issue.

STRONG RESULT

Mocap users get to stream data in real time directly to Maya, which is good news for practitioners of virtual production methods. Frame rates are acceptable, even for scenes on the heavy side – more so with Maya 2011's Viewport 2.0. Rendering may not be as speedy as a dedicated real time engine, but that's weighed against the luxury of keeping everything in a single package. Recording functionality comes in the box, although without the presence of native 'takes' in Maya, there can be some clumsy fiddling with animation layers to capture multiple performances.

Joints can have force attributes added to describe physical properties, and the results are impressive. Combined with a movable centre of mass, characters can react to uneven surfaces, weighty objects and the like in a lifelike way, using arms to balance and truly involving the whole body. While this looks cool playing around in an offline scene, game developers would benefit most here, where force tasks can be driven by a traditional physics pipeline to dynamically change motion in-game.

With an attractive price point compared to rival animation-specific packages, there's great potential here for the artist or small studio looking to animate in a hurry, allowing time to be invested more on crafting motion and less on initial set-up.

"[illegible] to be the skill to [illegible] to be neutral in crafting motion"

For high-end productions and studios with bigger budgets, however, character teams would almost certainly still want to go to the trouble of creating a full articulation rig from scratch to allow precise and predictable control. IKinema remains of great value in this arena, though: mode teams can quickly pose test topology; character TDs can prototype deformer systems and joint placements; and mocap teams can take data into Maya earlier in the process, for either live retargeting or post editing. It's in this latter area that it seems the most value is to be had in IKinema's current incarnation. ■



Streaming data from mocap software into Maya brings virtual production straight into the hands of animation and pre-viz teams

3D VERDICT

PROS

- Retargeting and streaming directly in Maya
- [illegible]ving mode works well on a variety of non-standard hierarchies
- Speedy set-up and intuitive workflows

CONS

- Solver can be unpredictable with v[illegible]ations
- [illegible]h retargeting out of the box
- [illegible]ceable absence[illegible] [illegible]rforming det[illegible]

IKinema is a quality release that will benefit animators at any level, whether utilising the straight-up full-body tools or streamlining existing pipelines

Visualisation and presentation tool

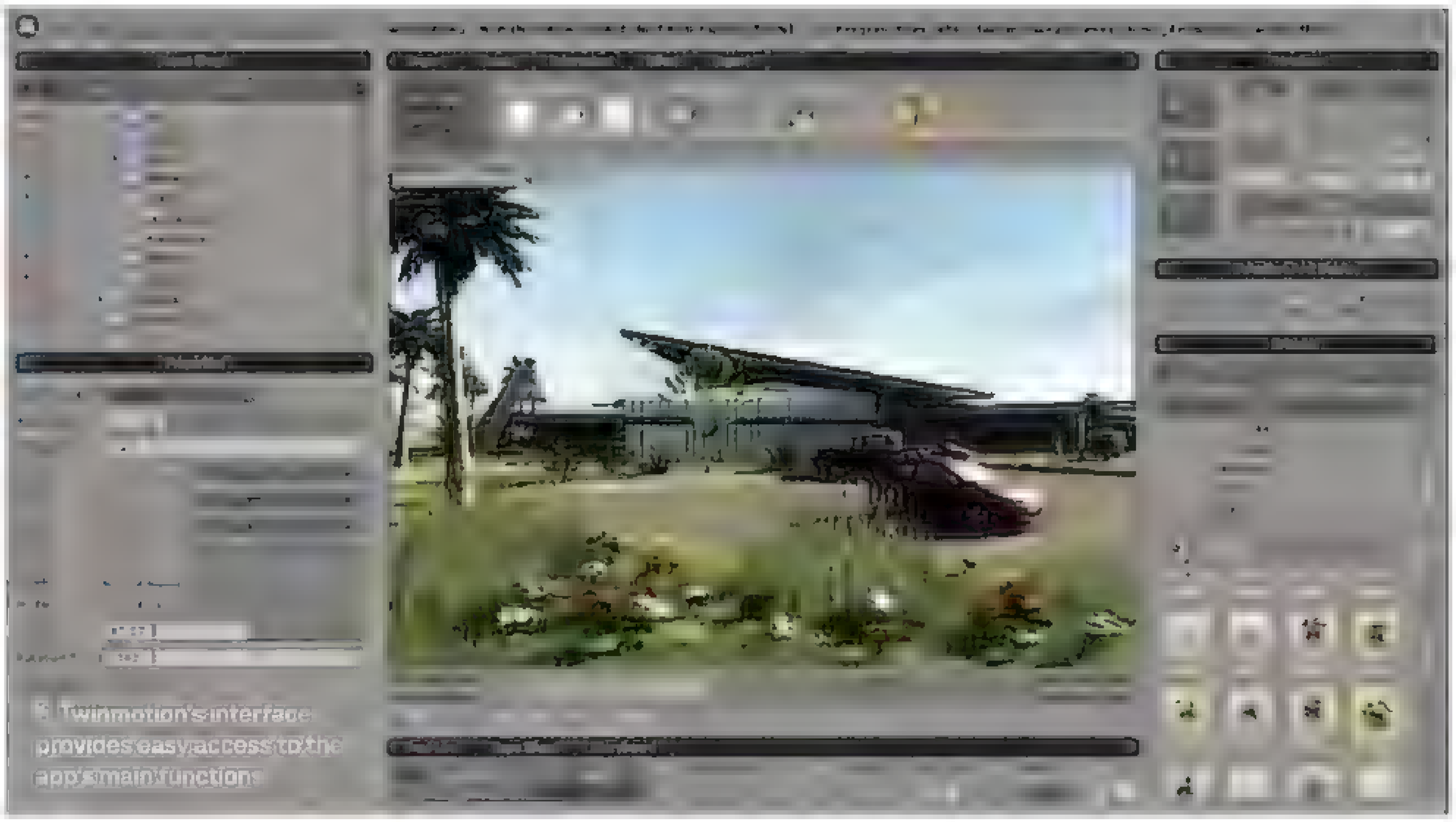
PRICE
€1,846 / $2,990 +

PLATFORM
Windows

MAIN FEATURES
- Real-time
  on, mod fication
  cene popul at on
- toolset
- I
  t
- Content l brary
-

DEVELOPER
Ka-Ra

WEBSITE


Twinmotion's interface provides easy access to the app's main functions

Twinmotion 2.2

After five years of development by a combination of architects, programmers and 3D visualisers, is Twinmotion 2 the perfect real-time visualisation and presentation tool, asks **Michiel Quist**?

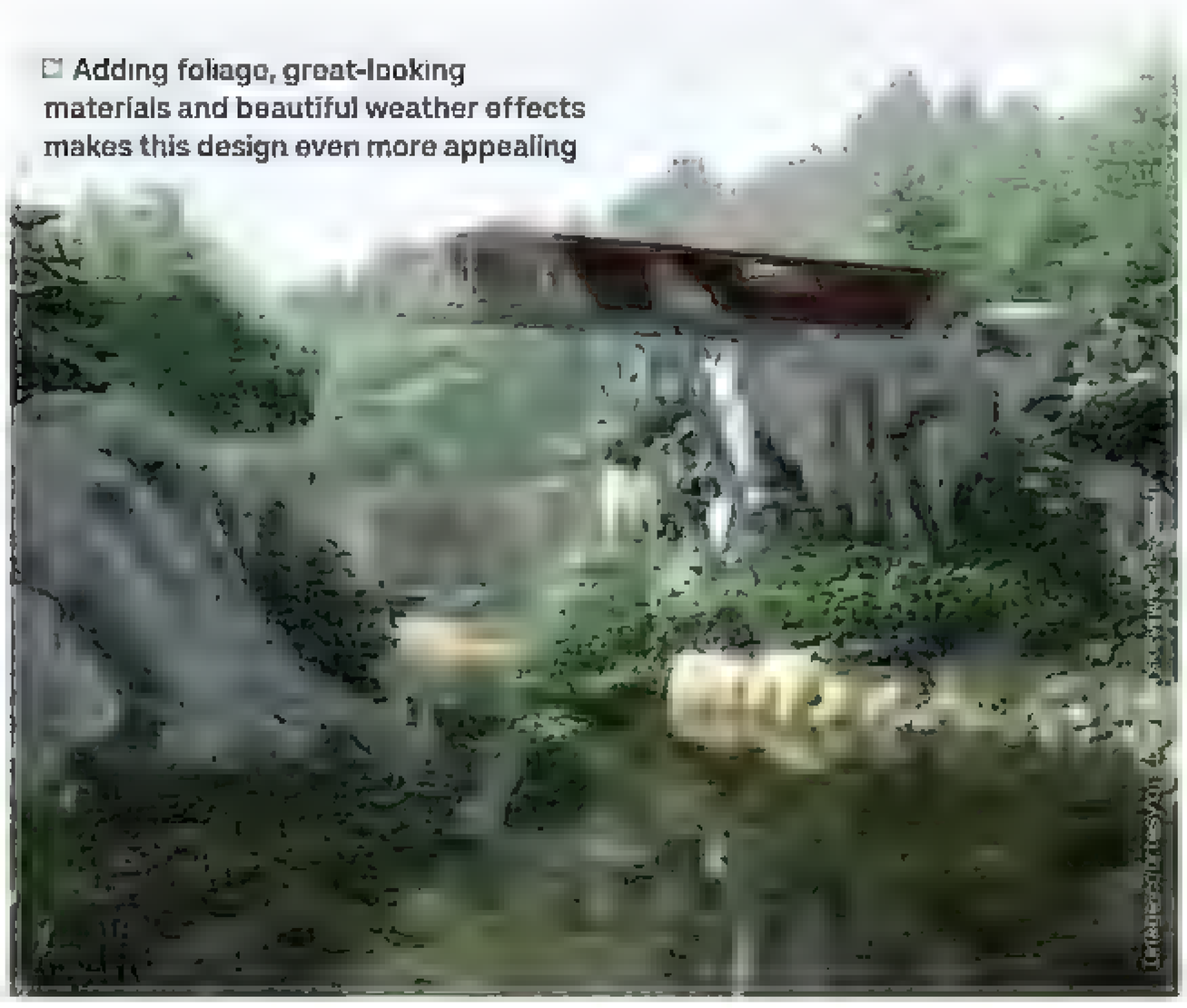
Originally formed by two architects, Ka-Ra has recently released Twinmotion 2.2. Its primary aim is to give architects the ability to create stills, animations and interactive walkthroughs in just a few minutes. You're able to import, create and modify models, add materials, and set-dress the environment with several objects to make the final presentation more appealing.

I've reviewed Twinmotion on an Nvidia GeForce GTS 350M graphics card, it's, of course, recommended that you buy the fastest graphics card your budget allows.

After opening Twinmotion, you see a well-structured interface with clear sections for all the main features. To the left is the Scene Graph, with a list of all objects, cameras and lights in the scene. It has a structure similar to Windows Explorer, so browsing is straightforward. Clicking on an object or camera selects the object and shows all of its properties, such as position, rotation, material and animation. The middle UI section shows a toolbar with Import, Create, Interaction, Effect and Export tabs, plus a real-time viewport and the Time Line.

On the right side are three main sections. In the Transform section, you can enable or disable certain transforms, and can even disable certain axes in the transforms. There's also the possibility to alter the grid, rotational snaps and positional snaps. The Selection And Display tools are everything you would expect them to be: you can use Selection And Display filters per object type, pick materials from objects, and lock selections. In the Browser section, you can select objects and materials from the library.

If you don't like the layout or you like working with multiple monitors, you can undock all these menus and arrange them to your liking or place them on your secondary monitor.


Adding foliage, great-looking materials and beautiful weather effects makes this design even more appealing


organiser of the End User Event

WORKING WITH GEOMETRY

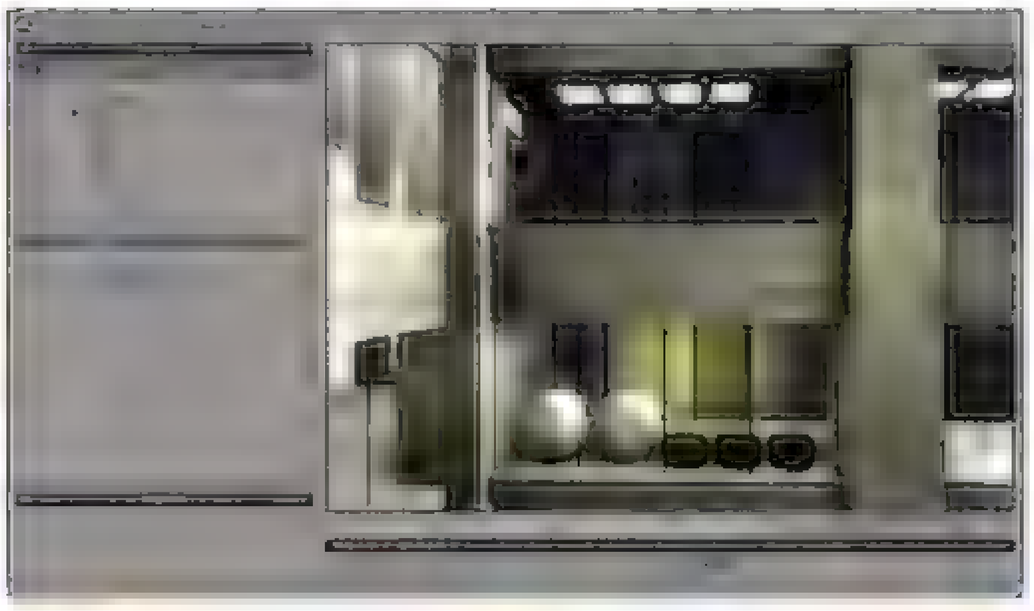
Twinmotion imports the most common 3D file formats, including FBX, OBJ, 3DS, X, DWG, KMZ and DAE. Besides the 3D model, you can import LODs, containers and camera paths. The LODs (Level of Detail) comprise between two and 10 models that can be in any 3D file format. For each LOD, it's possible to set the view range and add special optimised materials, for instance. Importing a container enables

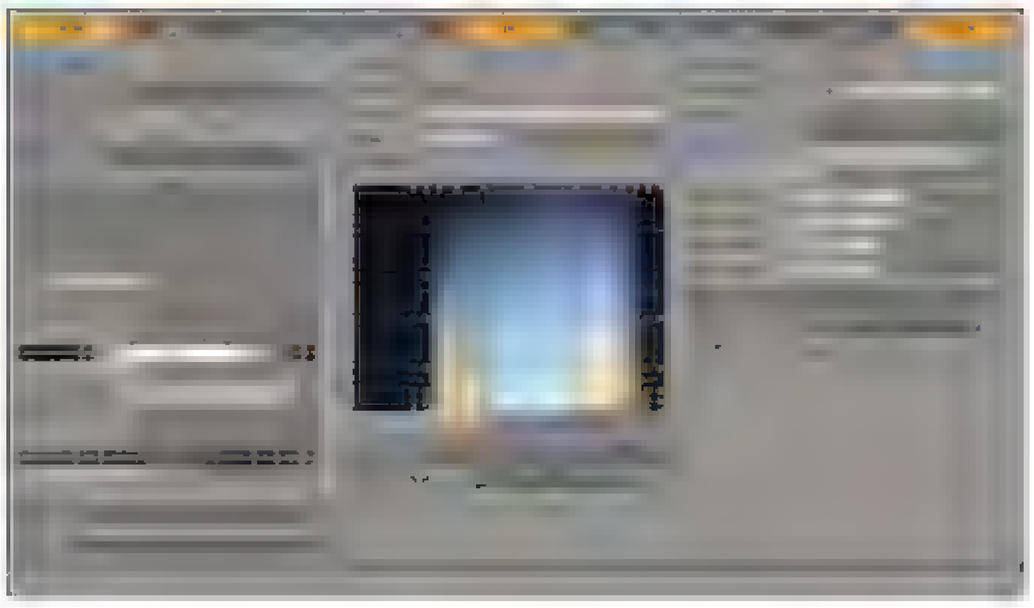


Image courtesy of Médiathèque André Malraux Strasbourg France by Ibos & Vitart architects

Combining AO, several attenuated lights, reflections and colour correction can give almost photo-realistic images

The interactive export workflow can show the Scene Graph, which makes hiding or unhiding objects easy to achieve





All colours and values in the sky system can be modified and animated

you to merge Twinmotion native files into the scene. Containers can be compared to groups or layers with objects in them. You can also import an animated camera from another application.

You're able to build and modify models yourself in Twinmotion. You can start with simple 3D primitives – box, sphere, cone, pyramid or plane – or create 2D primitives and extrude them in various ways. You can modify the geometry of original or imported 3D models in many ways. Next to selecting sub-objects such as vertices, edges and polygons, you can edit and create extra geometry. The editing options are much like the toolset you find in SketchUp: extrude, bevel, inset, loft, create face, flip normals, cut and slice, for instance. In the Modifiers section, you will also find Mirror, Array and a measuring tool.

In the Mapping section, you can create box, cylindrical or planar UV mapping. These can be applied to mesh sub-objects, so you can have multiple materials with different mapping co-ordinates on one mesh. Apart from creating UV mappings, you can also modify them in several ways; Fit to Edge, Fit to Face, Match UVs, Create a Mesh Part and Reset UVs.

The materials workflow is everything it should be: you can either drag from the content library or create your own materials, changing diffuse, common parameters, specular, bump, glow, overlay, reflection, water and wind.

Twinmotion comes with a big content library to populate a scene, then add materials and sounds – although it could do with a few more vehicles. You can also import your own models or LODs.

Animating objects can be done by sliding the Time Line, then moving and rotating the objects. Twinmotion sets automatic animation keyframes, although scaling isn't supported.

You can then enhance the look by adding effects such as sun, sky, clouds, fog, HDR, ambient occlusion, sunbeams, depth of field, anti-aliasing and colour correction. All these effects are in real time, and have some impact on the render times.

One of Twinmotion's biggest strengths is the ability to export the scene as an interactive standalone application. This application can then be distributed freely: there are no extra licensing costs of the kind some authoring applications have. To make the outputted app more functional, Twinmotion has the option to add triggers, sounds and physics to the scene. There are several types of triggers that can be added: On Time, On Collide, On Click and On Key. These can trigger almost anything in the scene, from changing cloud colour and unhiding objects to initiating animations and loading entire new scenes.

Another way to enhance a presentation is by adding audio. The sounds in the scene are spherical, with range and attenuation, so you can define the volume and placement of each sound. Twinmotion can currently only import WAV files.

Physics in Twinmotion is limited to collision detection of the camera. Twinmotion supports Nvidia PhysX but will switch to CPU collision calculation if PhysX is not present. You can also turn the collision on or off per object, which means you can exclude high-resolution meshes, helping to speed up the calculations.

Twinmotion is a well-designed and stable piece of software, and is good value for money. Its strengths are the ability to create, modify and materialise geometry, animate almost everything in the scene and export to an interactive standalone application. The areas that need a little more work are related to rendering. I've been told that Ka-Ra is working on the limited output resolution, but what I want to see even more is better control over rendering quality. I don't mean that the quality is bad, but rather that if I'm exporting to animations, I don't want to see thin geometry crawl, and I want to be able to force an update on the real-time reflections in every frame. ■

3D Verdict

PROS

- [illegible]
- [illegible]
- [illegible]
- [illegible]

- [illegible]
- [illegible]
- [illegible]

Twinmotion is recommended to any architect who needs to visualise and present their designs and to studios that want to build interactive presentations

Match-moving package

PRICE

- [illegible]
- [illegible]

PLATFORM

Windows / Mac

MAIN FEATURES

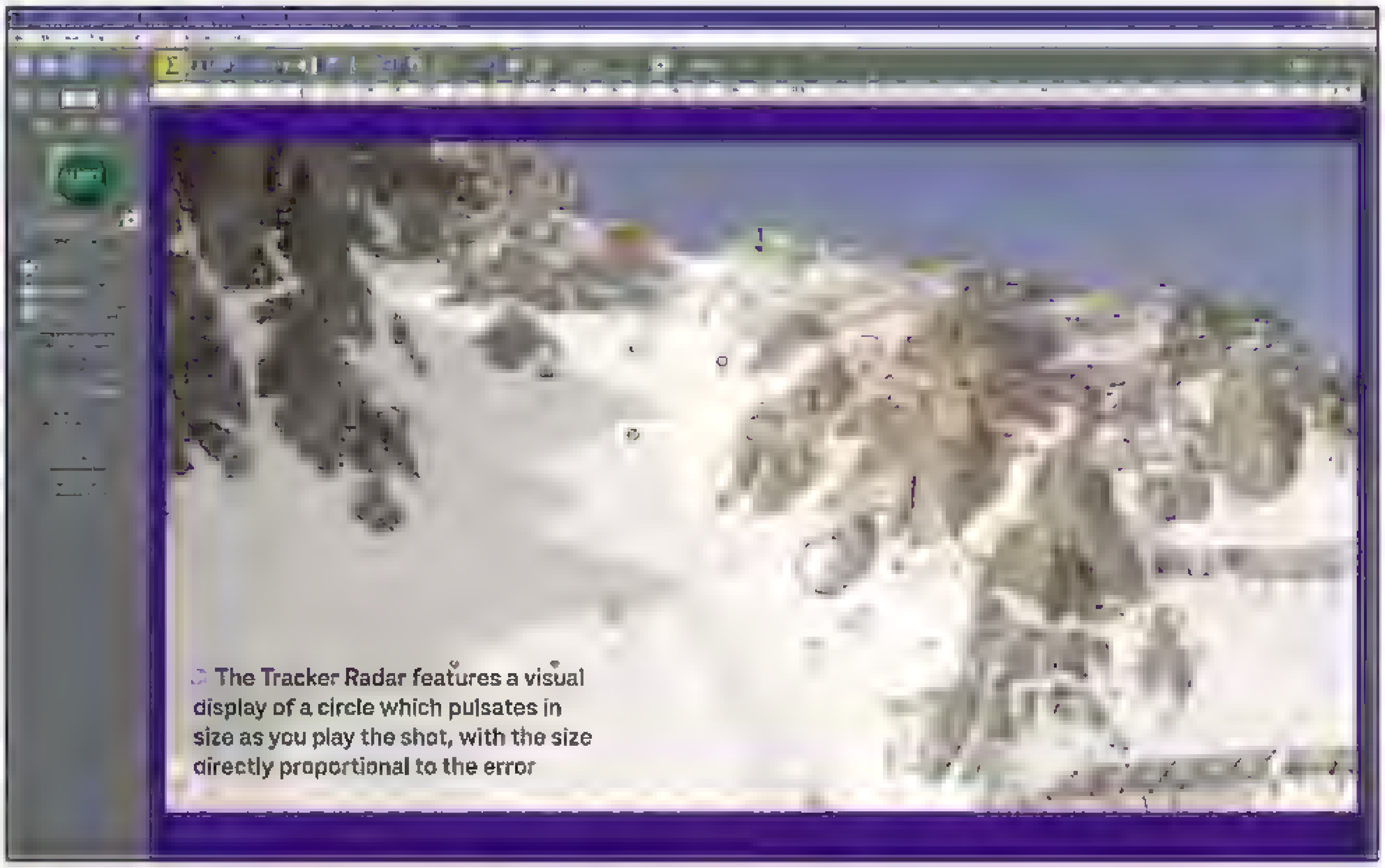
- [illegible] Track v ew
- New anays s too
- [illegible]
- [illegible]
- [illegible]

DEVELOPER

And[illegible]on Techno ogies

WEBSITE

[illegible]ech.com



The Tracker Radar features a visual display of a circle which pulsates in size as you play the shot, with the size directly proportional to the error

The backplates in these images are courtesy of Dan Schutt

SynthEyes 2011

This keenly priced match-moving update offers an improved tracking workflow and distinctive features, says Mark Spevick

The match-moving market has a few big names that larger production houses regularly use, each with its own strengths and weaknesses. Each supervisor has their personal favourite. The thing that tends to distinguish the popular software packages from each other is that most seem to have a novel feature: PFTrack with its optical flow technology, say, or boujou with its automatic hands-off approach. This is probably why larger production facilities usually have a few licences of each.

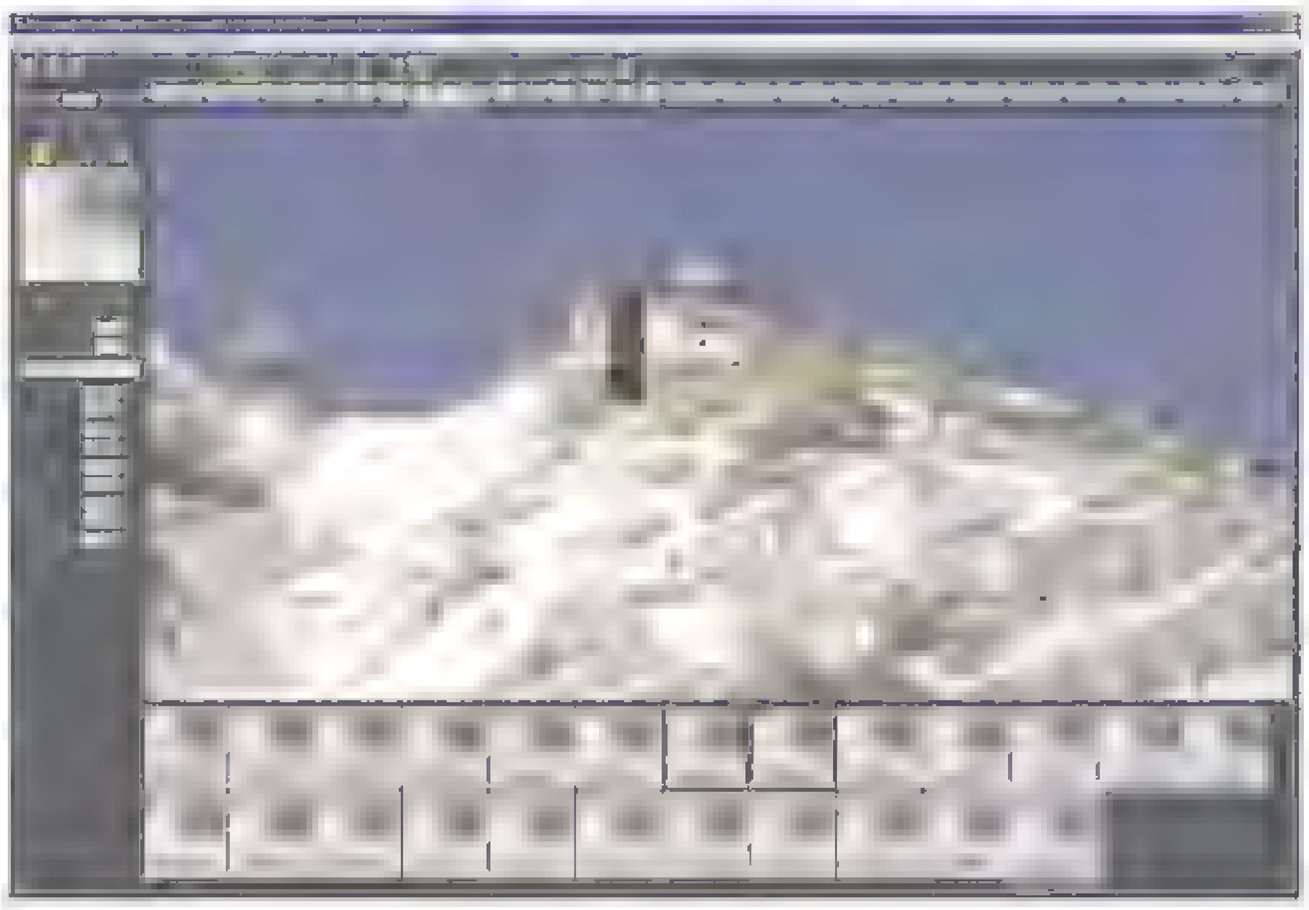
SynthEyes' biggest strength has always been its outstanding price. Don't let the low price fool you, though: the feature set is incredibly rich. It's been a couple of years since the last major upgrade, and Andersson Technologies has really paid attention to some of the needs of the VFX pipeline. There are new tools for evaluating trackers and solves, and useful improvements in the software's stand-out feature: the use of photogrammetry to generate and texture meshes.

Supervised tracking is a technique used in all match-moving software: it enables the user to specify features to fix problems and guide the solve. Accurate placement is essential for a good solve. Depending on the type of shot, making and analysing these manual tracks can be a time-consuming process. It's common to place manual keyframes and track the feature between these keyframes. Once these are made, it's usual to go through and check that the feature doesn't drift, as any errors will put off the final result. This often requires watching the features through, to check and see if everything is well.

THE BIG PICTURE

SynthEyes 2011's new SimulTrack view is a spreadsheet of swatches that show all the keyframes of a supervised tracker simultaneously. This is a great idea: it makes the visual inspection of how well a tracker follows its feature almost instant.

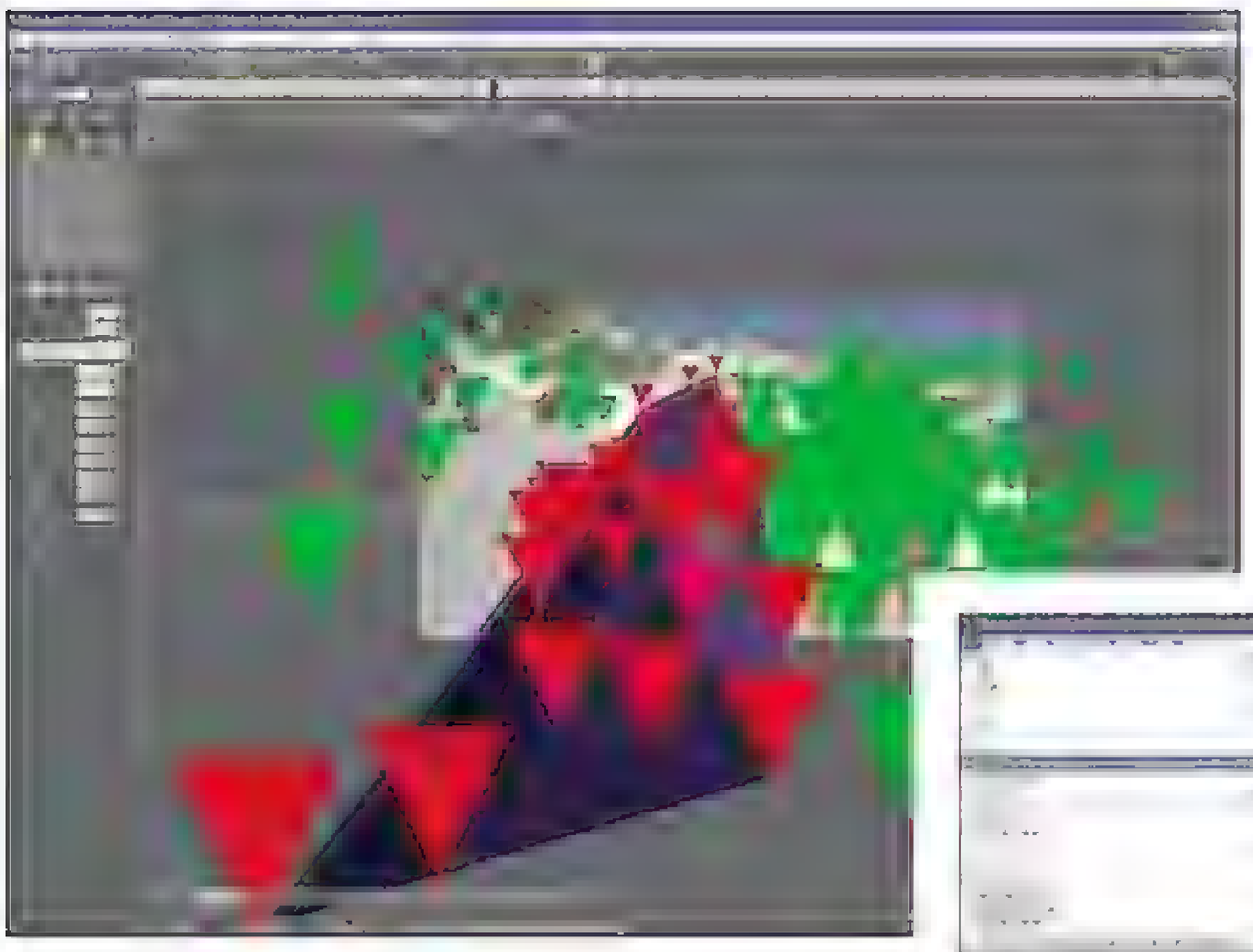
As you look across the swatches, it's easy to see if they are all tracking the same feature. If any of the keyframes are misaligned, you can just drag them to a new position. If you click between the swatches, the view expands and shows all the frames between the keys, so you can see if the motion between them is correct. If not, you can move the swatch and a new keyframe is made. The great thing is that the frames before and after are updated in all the swatches, so you can directly see how your changes affect the path as a whole. This really helps to make

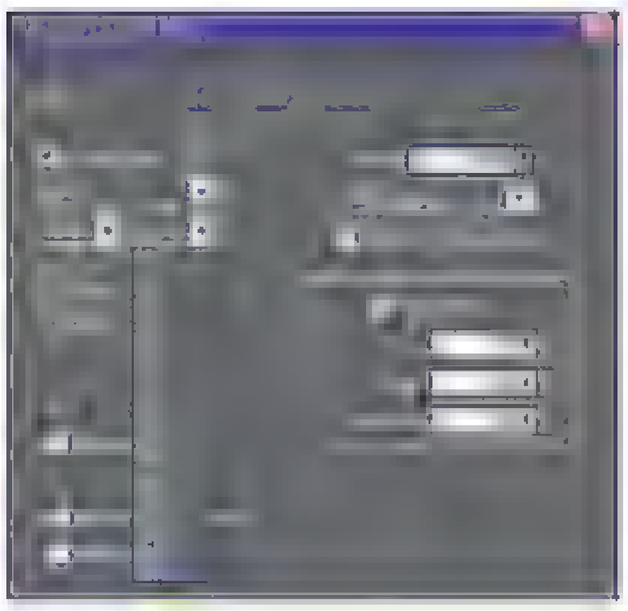


A simultaneous view of all the keyframes of a supervised track. You can re-correct the track and see all the swatches update in real time

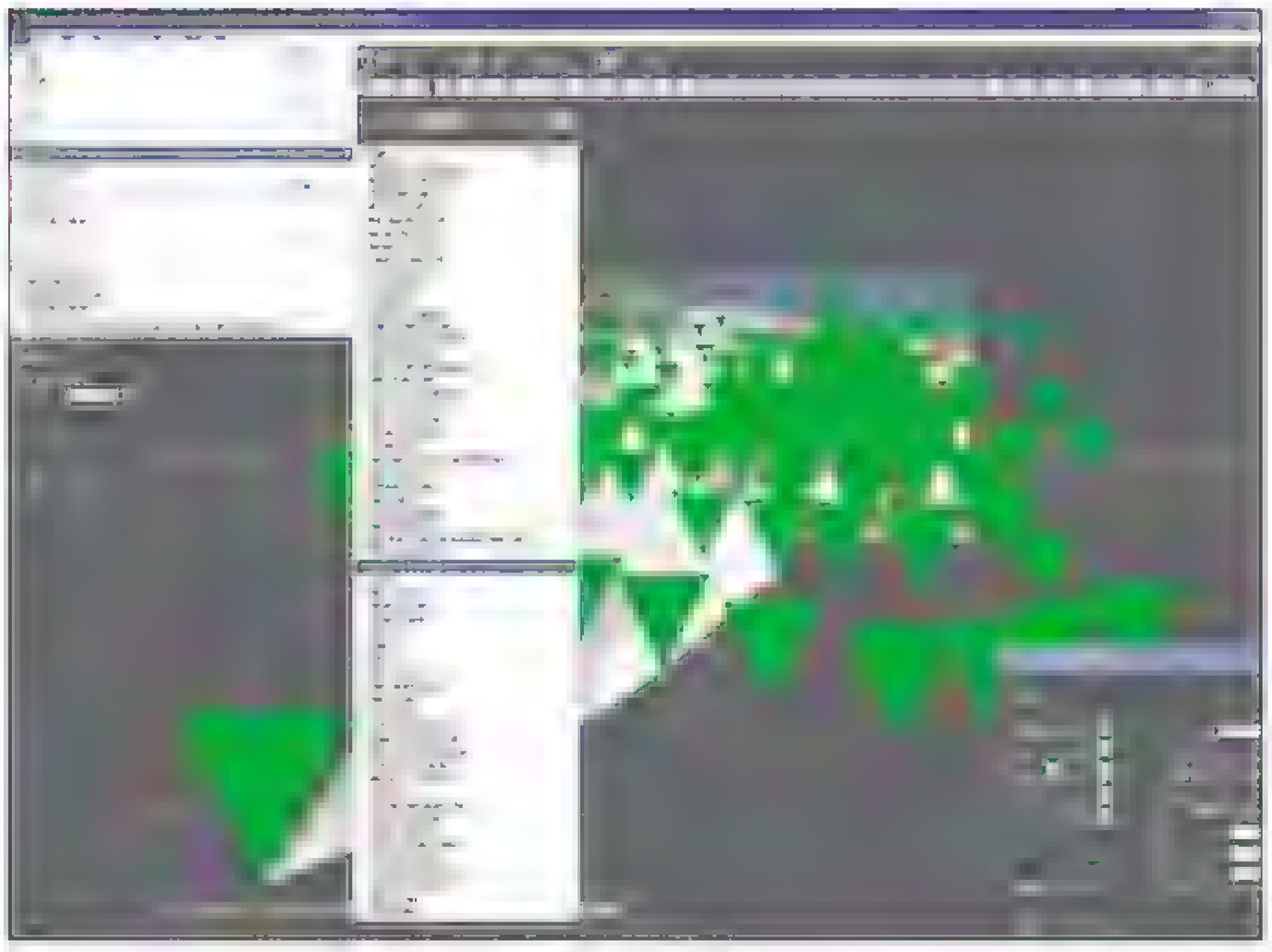


[illegible] been a VFX artist [illegible] match-moving on films including Troy and Casino Royale. He now enjoys sharing the knowled[illegible] at Escape Studios





Textures with resolutions up to 4K can be made from the images in a sequence. The 64-bit edition is essential to handle the highest resolutions



Lasso-selecting 3D features in SynthEyes 2011 allows the creation of a mesh based upon those points. The mesh can be re-edited, providing great flexibility

the supervised tracking experience fast and accurate.

Another nice touch in this view is the ab lity to strobe. This is based on the technique of centring the view on a tracker and quickly switching back and forth between keyframes to compare the movement. If there's minimal movement, then you're accurate. SynthEyes does th.s flicking between keyframes n the SimulTrack view, so you can see these shifts easily. You can move the keyframe around while strobing, until the movement between the keyframes is minimised. Any auto track can be converted to be analysed n this way.

Checking the accuracy of the so ved 3D point against its tracked feature .s another time-consuming task on tricky shots. The norma approach is to analyse graphs to find out where the problem areas .e. The graph tools are still a weakness in SynthEyes: selection and navigation are a bit clunky compared to the competition. There is now the abi ity to colour features based on the RMS (root mean square) error, wh ch is worked out from the difference between the second feature and the 3D point. Green is good, ye.low is a caution and red is a bad error. PFTrack uses a simi ar colour scheme, wh ch makes visual inspection in the viewport easier. SynthEyes also offers another approach in the form of Tracker Radar, a d splay of big red c rcles whose size is proportional to the RMS error. Th s is a great visua aid: when you play the sequence, you see these red c rcles pulsat ng in s ze, so it's easy to spot the problem areas.

3D PICTURES

The feature that sets SynthEyes apart from its peers is in its approach to photogrammetry. This is the ability to generate geometry from 3D features, as well as generating UV maps and high-quality textures based on the footage. This has many uses in a VFX p peline, from extracting elements from a background to set extensions.

Making meshes is done through the perspective view. Here you get new menus that offer movement and select on options. You can lasso the features you're nterested in and after a couple of operat ons, you triangulate the mesh. This is a bit convoluted: it might have been an idea to make the initial mesh generation a separate option instead. All meshes can be edited, and the po nts tied to the solved points. These relationships can be fed back to the mesh even if you change the solution, al owing great flexibility.

The big new feature is the abi ity to make high-qual ty text.res based on the footage. This needs special UVs, and a variety of options allow the mesh to be used for many purposes. In rolling front-projected mode, the UVs change frame by frame, ensuring that the mesh is invisib e but can still be used for shadow catching; while frozen front-projection mode makes the UVs on the first frame and keeps the image changing, which s great for us ng animated patches for rig and object removal jobs, for example.

The new texture extraction system uses camera mapping of many frames, based on the solve, to create high-resolution textures with reduced noise. This has several advantages over tradit onal camera mapping techniques: the process is great y simplified, while the textures generated can be at any resolution and are relatively noise-free. For high-resolution work, as in production, big textures are required and this process is memory-hungry, so a 64-bit system is recommended.

There are a lot of feature changes n SynthEyes 2011, but the quirky nterface remains. Some areas are hard to navigate, and it can be awkward to select components, for example in the graph editors. But this can be forgiven when you realise that, for a small price, you have access to powerful features that can not only help speed up your work, but also aid n so many other jobs around the facility other than just so ving shots. ●



The final mesh and texture can be exported in a variety of formats. The Export menu could do with a little bit of organisation, though

3D VERDICT

PROS

- [illegible]
- [illegible]
- [illegible]s from tracked features
- [illegible] high-quality text[illegible]

CONS

- Quirky interface
- Not ava.lab e pat[illegible]
- Scripting not in Python like other softw[illegible]

A keenly priced piece of software, considering the powerful and production-proven match-moving toolset

Atmosphere generation plug-in

PRICE

PLATFORM

MAIN FEATURES

DEVELOPER

WEBSITE



Starting from a preset, about half an hour of tweaks and low-res tests, you get skies that would make photographers jealous

Ozone 5 comes with the same presets from previous editions – some updates would be nice

Ozone 5

This atmospheric plug-in adds V-Ray support – and delivers stunning content with little difficulty, says Lee Johnson

With Ozone 5, e-on software has brought realistic sky creation to a whole new segment of the industry. In addition to supporting the native render engines for its five host packages – 3ds Max, Cinema 4D, LightWave, Maya and Softimage – this environmental plug-in is now compatible with mental ray (in 3ds Max, Maya and Softimage) and V-Ray (in 3ds Max and Maya). I've used both V-Ray and mental ray in production, and have likes and dislikes with both, although V-Ray is my primary renderer. We'll look at the integration of Ozone 5 with both rendering systems here.

In both mental ray and V-Ray (with GI on), the colour of the sky is added to any environmental colour you've chosen. Adjustments made to the Lighting Intensity setting contribute to the lighting of the scene as well as the sky background, just as adjustments of the lights in the scene affect brightness of the sky background. You might think that this could lead to a round robin of tweaks, but Light Balance adjusts the atmosphere's contribution to the scene. Light sources become sunspots in the sky, which show up in any reflective materials, along with the rest of the sky. You can add and edit cloud layers easily in the editor. Haze and Fog settings will soften or obscure objects placed further from the camera, adding realism. Ozone works in the same way with mental ray's Sun and Sky systems, V-Ray's Sun and any standard lights, so whatever method you prefer for lighting your scene, Ozone delivers the same stunning result.

Setting up network renders for mental ray and V-Ray is a breeze: install the render licence, and you're off to the races. Taking advantage of V-Ray's distributive render was equally easy; mental ray's was more difficult.

Ozone 5's integration into mental ray and V-Ray is great: it works seamlessly with render elements for both engines. Your compositor will not have any technical headaches. But render times at production resolution are pretty hefty. Throw 500 frames of HD exterior camera at it, and you are looking at some serious CPU time.

Render times for mental ray vs. V-Ray actually have mental ray as the faster. However, this is only if you take that render as is: if you add render elements to the mental ray scene, render time goes up. The time difference between no passes and all passes in mental ray is staggering. Rendering all passes in V-Ray, on the other hand, takes no longer than rendering no passes. So how you output an image has distinct advantages or disadvantages depending on what engine your pipeline is built around.

The other negative is the necessity to have additional render licences to manage either network or distributive rendering. Consider your pipeline's capabilities before trying to push through long sequences.

Ozone 5 is a great package. It's easy to install, fast to set up, and simple to adjust to what you want. Stuart Sati's Dreamscape, a terrain and sky plug-in for 3ds Max, is more expensive, but doesn't require render node licences. Ozone's render times are heavier, but the results are fantastic, as the clouds are fully 3D and can be rendered close-up. An upgrade for existing users may not be necessary, but for new users (especially if you have V-Ray), this is a great addition to your toolset. And a free unlimited PLE version gives you all the time you need to run it through the paces to see if it's right for you.



3D VERDICT

PROS

CONS

Ozone 5 quickly creates photo-real backgrounds for your renders, freeing you to focus on the foreground elements and stay productive

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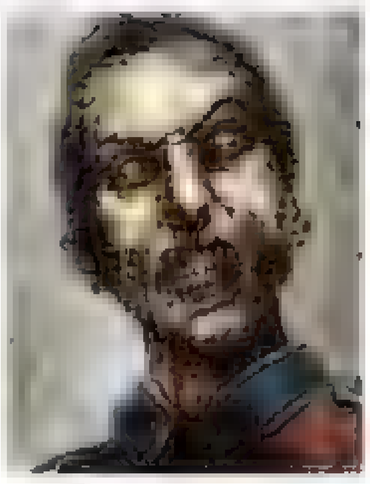
Meshing performance capture techniques with a unique narrative, the Dead Island trailer has provoked a strong online reaction

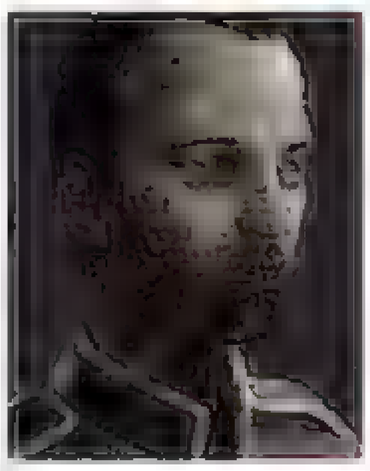
Debrief
Studios look back on the highs and lows of recent commercial jobs

Dead man's tale

Axis Animation co-founder Stu Aitken reveals the lessons learned while creating the acclaimed trailer for upcoming zombie survival game Dead Island

VITAL STATISTICS
Title: Dead Island Announcement trailer
Format: TGA sequence @ 720p, 30fps
Client: Deep Silver
Studio: Axis Animation
Director: Stu Aitken
Producer: Andre Pinto
Project length: 20 weeks (including pre-production)
Team size: 20 3D artists, animators and TDs
Leads: Bruce Sutherland (animation), Sergio Caires (shading and lighting)
Software used: Modo, ZBrush, Photoshop, Maya, Houdini, Fusion and Premiere as well as various in-house tools and plug-ins





Pre-production defined a look for each character, including this bellhop

Axis was commissioned by publisher Deep Silver to produce the Dead Island Announcement trailer in the late summer of 2010, although we'd been aware of the game and discussed ideas with them for some time before that. The brief was to create a piece that would announce the game, developed by Techland, in an arresting and memorable way.

During a lengthy pre-production phase, we eventually arrived at a final treatment where we would feature a brutal attack on a young holidaying family by zombie tourists and hotel staff. We decided on an unconventional editing structure for the piece: half of the narrative arc would be played out in graceful reverse slow motion, intercut with staccato real-time stabs of an earlier period to add contrast and heighten the sense of jeopardy.

We wanted the audience to view these events in a manner that would make them look at what was happening more closely than normal and really engage with the story we were telling. We used every trick we could think of to create interesting contrasts in character, performance, pace, edit, structure, timing and lighting.

What we did right

1. Story

We spent a long time during pre-production discussing things with Deep Silver to make sure we had the treatment, script and concept spot-on before we commenced production. We concentrated on delivering a compelling narrative over anything else.

Acting would be paramount in getting the story across. We cast really good actors: strong acting meant believable performances on screen that the audience would empathise with. We also had a custom score written for the piece: composed by Giles Lamb at Savalas, it really added a lot of impact.

2. Technique

We shot motion-capture twice. The first set was just an aid to develop the narrative and experiment with performance ideas and pacing. This was invaluable in showing us what kinds of movement worked well in reverse and what didn't. Subsequently we re-shot the main performances with the full cast, where we could be much more precise.

We successfully R&D'd and implemented full-surface facial capture (a high-resolution



About the author
Author's industry experience with bio

Axis worked closely with its actors to engender strong performances as the root of its animation workflow

mesh of the actual actor's face in 3D and at 60fps) on the human characters. This was done in conjunction with Dimensional Imaging, who developed the technology.

3. Ambition
We concentrated on detail and execution at every production stage. This piece has more dynamics, animation polish, sophisticated shading and lighting, and detailed effects work than anything we've done previously. We used Houdini as the core of our shading, lighting and VFX pipeline. Making a lot of this stuff work was hugely dependant on the power and flexibility that we get from Houdini and its Mantra render engine.

What we did wrong

1. Scheduling
This is one of the few projects I've been involved with where I can honestly say we didn't get much wrong! We ran up against time constraints on a few things. I'd have loved to have pushed the level of polish even further. There are still some places where we could gain from efficiencies in the pipeline – especially dynamics, which took a fair bit of time to get through. (There are cloth, hair and fluid dynamics in practically every shot.)

We underestimated just how much work was going to be involved in delivering the level of detail we ended up with – but we worked around that, because everyone felt the end result was going to be worth it. This included reworking some aspects, especially the character assets, even though that caused some unwanted delays in our schedule.
Hair rendering caused a few issues as well, especially where we had time-ramped slow motion, but that's just a matter of more R&D time to resolve some remaining niggles.

2. Lighting details
The green lighting in the corridor sequences was tricky to grade the way I wanted it: green light and skin tones really don't work that well together! The lighting direction we implemented in the corridor worked much better with the characters against the light, as opposed to some of the earlier shots, where the camera was looking the other direction.

Lessons learned

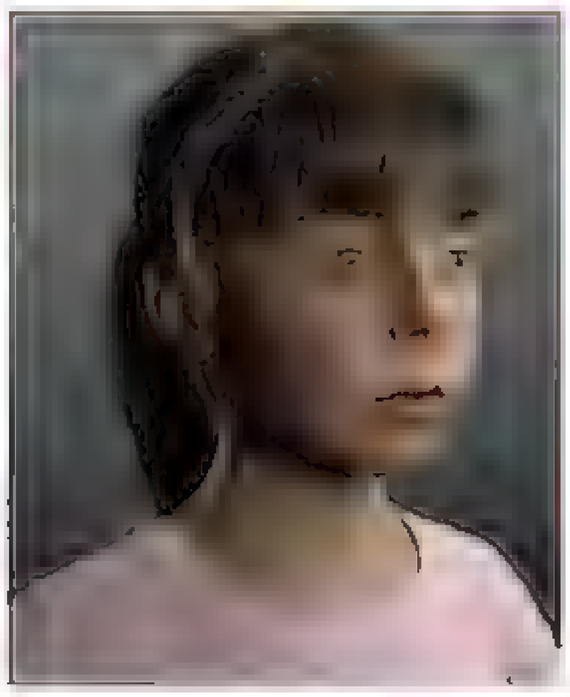
The biggest thing doing this trailer taught us is that the inherent concept and treatment, and how that is executed from a narrative perspective, is really what matters. We kinda knew that anyway, but the overwhelming

A typical scene breakdown, with the wireframe view at the top, animation rigs shown in the middle and OpenGL preview lighting at the bottom

As well as the acting, Axis had to work hard to perfect cloth and hair dynamics and achieve a realistic feel



A new system developed with Dimensional Imaging took care of facial capture



The family's daughter is the central narrative component within the trailer



"Dead Silver took a big risk with where we went on this project, and showed a lot of faith in our ability to deliver what was a complex treatment on paper"

response the trailer has garnered has been amazing: it's made us much more confident about that, and I think that's mainly down to the film-making and storytelling on display. The guys here did a tremendous job on the execution, and I think it just goes to show that if you go the extra mile, it really does pay off.

We also really pushed our pipeline to a new level in almost every department on this job. We'll be endeavouring to make sure we leverage those advances, build on them and make them more efficient. I think our lighting pipeline in particular has really come on leaps and bounds over the last year in terms of the level of sophistication it's capable of delivering, while still maintaining reasonable render times per frame. There are a few situations that we need to work on, where they still go through the roof.

Finally, I think the relationship we had with our client on this job was exemplary – it was truly collaborative, and that's an important aspect. The way we were able to bounce ideas off each other and stay open-minded about the possibilities was a big factor in how things turned out. Ultimately, Dead Silver took a big risk with where we went on this project, and showed a lot of faith in our ability to deliver what was a complex treatment on paper. The dynamics of how that relationship played out to get us to this point is definitely something we can learn from and take forwards. ■



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Deep into technology



Gareth Edwards modelled the many 3D environment enhancements in Monsters himself. "I had a ballpark idea of how many visual effects shots we could do in the time we had, but didn't really fully plan it," he says

Freeze Frame
Key moments in VFX and animation history revisited on DVD

Monster hit

Gareth Edwards tells Mark Ramshaw about his dual role as director and visual effects lead on his breakthrough movie debut Monsters

Young filmmakers and journalists alike thrive on stories of fellow hopefuls who – through some mixture of luck, talent and good timing parley their pet project into a box office hit and a golden ticket to Hollywood. Little surprise that the success of Gareth Edwards' debut movie Monsters (and Edwards' subsequent announcement as director of a big-budget reworking of Godzilla) has caused such excitement. That the movie, produced for a reputed £14,000, has also been universally praised by the critics certainly hasn't harmed any. Nor indeed has the added twist that Edwards also created his own stunning visual effects for the film.

Like most overnight success stories, Edwards' was a long time in the making. Leaving school in 1991, he signed up for a local Audio/Visual Diploma course rather than study for A-Levels, a move that led him to study for a degree in film at Farnham. "It was one of the better films schools at the time, but it was so frustrating," he says. "To make anything with real film cost £4,000, so you could only make one thing in three years. The rest of the time you'd have to piggyback on other people's projects. At the time I was sharing a flat with a guy called Andrew Howell, who was studying this brand-new thing called computer animation. It looked like that might offer the solution in some way to all the frustrations I was having with my course."

After graduation, Edwards ended up stacking shelves by night, so bought a computer on credit and set about teaching himself the ins-and-outs of CG. "I figured I had a year to learn how to use the PC before I'd have to pay for it," he laughs. "I ended up going to job interviews with a showreel of all my film work, and then would add silly things I'd done with LightWave right at the end. People would freak out that I'd been able to create this kind of stuff on a home PC when they'd been paying a fortune to studios. I ended up getting better job offers for my CG skills than my directing ones, and got sidetracked for another five years."

Edwards began working effects for the BBC's history TV department from his own bedroom, all the while trying to convince the channel's producers to let him direct something. When they did finally give him an opportunity, Edward says the results were terrible. "But it was enough to get another job, and work with bigger and bigger budgets until the peak came with the programme Attila The Hun."

Still unable to make the leap from historical documentary to drama, however, he watched as digital HD technology matured and the introduction of adaptors made it possible to fit pro-level lenses to standard prosumer camcorders. (Monsters was ultimately shot using a Sony EAX 3.) "At that point I dropped what I was doing, because I became scared everybody else would catch on and I'd miss my opportunity," he explains. "The next thing I did was to make a short film for the London Sci Fi Film Festival. It was this that I showed to Vertigo, who signed to produce the feature film."

Ironically, given all the press inches about the cost of production, the director never had a real conversation with Vertigo about budget: "If there were ever any arguments with the producers, it was because of me trying to talk them into spending less money. They were trying to protect the film, but I thought 'less money means less pressure'."

Edwards says he used every trick in the book to create convincing effects with the minimal amount of time and money, using lighting, scale and distance to ensure that the audience never actually needed to see the alien feet plant properly on the ground.

"In the end I leant heavily on my compositing skills, which is something I'm much better at," he admits. "For each creature shot I'd make a mosaic of the background, so that I knew whatever



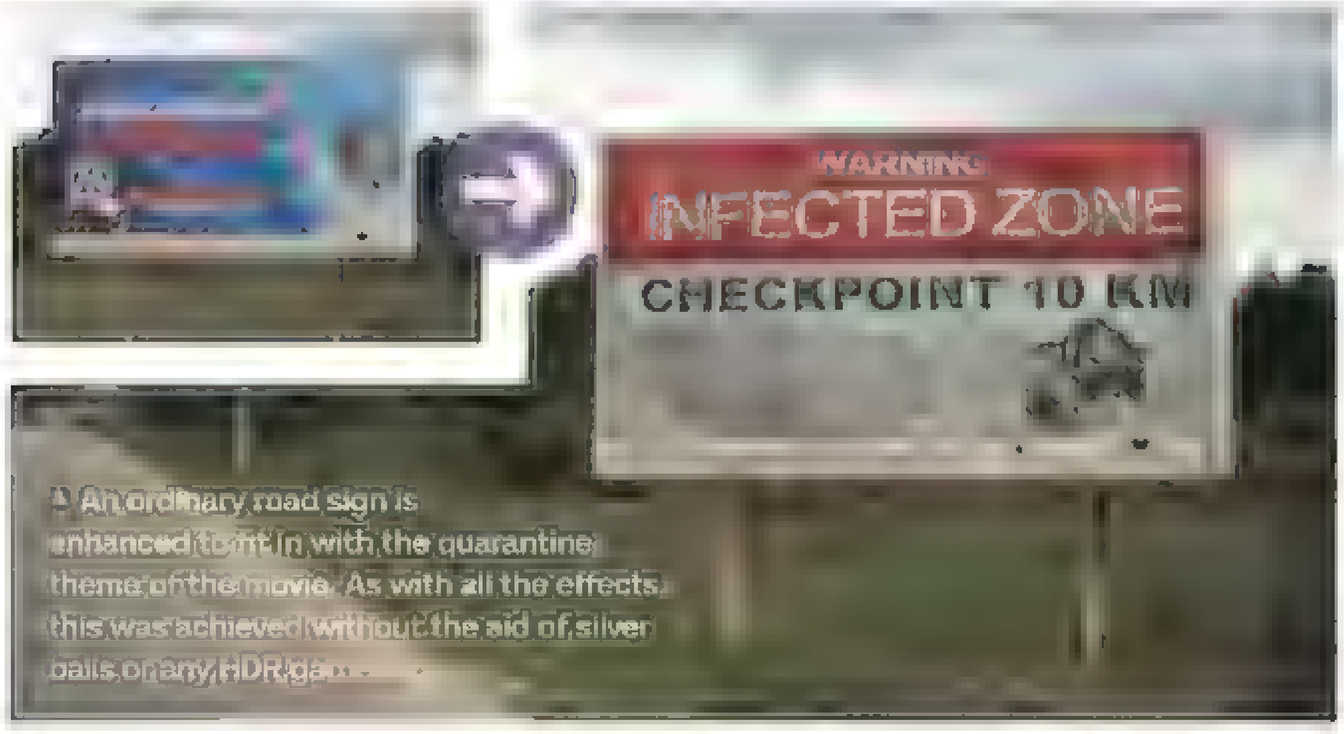
VITAL STATISTICS
Title Monsters
Released
US 1 February 2011
UK 11 April 2011
Format Blu-ray/DVD
Distributor
US Magnolia Home Entertainment
UK Momentum Pictures Home Entertainment
Watch for The tentacles dragging the downed fighter plane into the lake



KEY TECHNOLOGY

The titular creatures, who are actually used very sparingly in the film, were initially modelled in ZBrush and worked up in 3ds Max. Gareth Edwards says the design required a good amount of back and forth. "I'd model and rig it, position it in a shot and then realise that what looked cool as a sketch didn't come through, so I'd go back and remodel. That happened five or six times."

3ds Max's Character Animation toolkit proved a lifesaver, says Edwards, who used the tool's spider rigging as the basis for the creature's set-up. The tentacles, however, proved rather more problematic. "I looked everywhere for a solution, and then remembered that the closest thing I'd seen was a rope simulation. I attached one end of each rope to the creature's head and the other to where I wanted a tentacle to point to, then started playing with the gravity setting. By turning it to zero, I suddenly got all these amazing undulating animations with very little effort. The great thing about it being a rope simulation is that it provides real interaction with no crossover, but the ability to wrap around objects if required."



An ordinary road sign is enhanced to fit in with the quarantine theme of the movie. As with all the effects, this was achieved without the aid of silver balls or any HDR gags

"If there were ever any arguments with the producers, it was because of me trying to talk them into spending less money"

Gareth Edwards, director

I stuck into the shot could be put back into the background. I'd build up all these mosaics and a crude 'Doc Brown' model of the environment and block out the basic animation. Then I'd go in and find every angle, watching the blocking for each camera and tweaking things until I could render out each pass and move onto the next shot. You'd expect it to go badly wrong, but I was surprised just how much I got away with."

Having long despaired of ever getting a shot at feature film directing, Edwards admits the success of Monsters has been a shock to the system. "Back in Central America [during production], we would ask each other what would have to happen with the movie for it to feel like it had been worthwhile. A lot of the answers we said in jest have since happened. They held a screening in London with people dressed as characters from the movie; the crazy thing was they'd put more effort into it than we did for the actor's costumes! It's like firing something into space: if you don't get enough velocity you crash, but too much and it goes on forever. In a way, I feel like that's what's happened with Monsters."







The 3ds Max rig (top), plus passes for the backlight (middle), skin matte (above left) and tentacle stripes (above right). "The creature had an outer and inner body," says Edwards. "I'd animate the UVs so the stripes would scroll and move across the body. For the outer pass, a Tron-like tattoo acted as a mask to the layer below"

PolyTrans and NuGraf

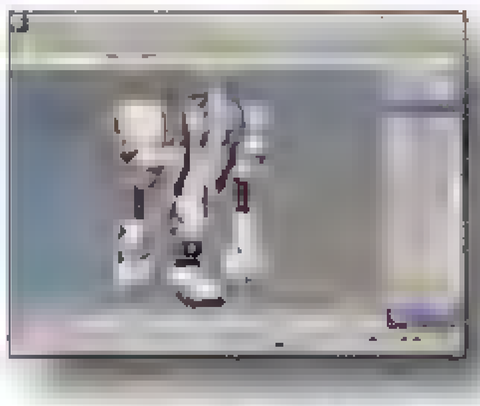
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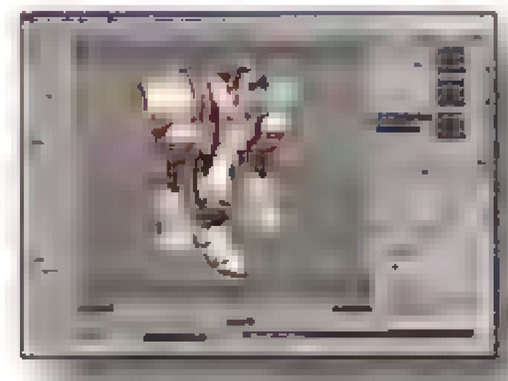
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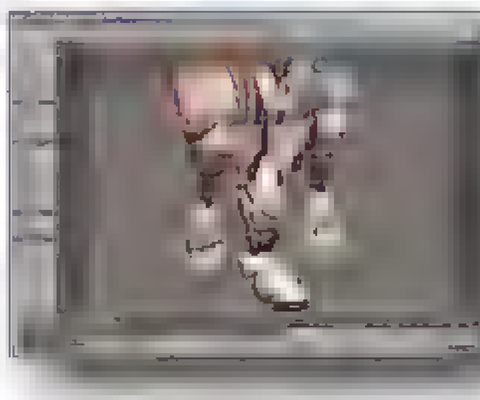


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ACIS Autodesk Inventor CATIA v4+v5, DGN, DXF/DWG/DWF, IGES JT Parasolid, Pro/Engineer, Rhino STEP, STL, Solid Edge SolidWorks U3D, VDA-FS, XGL

3DMF, 3DS DirectX HSF/DWF OBJ SW3D U3D (for 3D PDF) VET VRML X3D XAML XGL

PolyTrans-For-3dsMax
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DGN DXF DWG DWF Collada FBX IGES OBJ VRML X3D

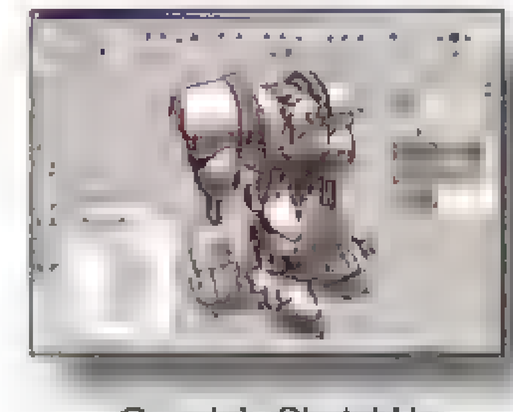
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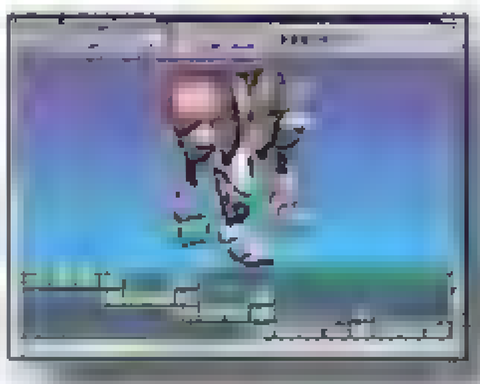
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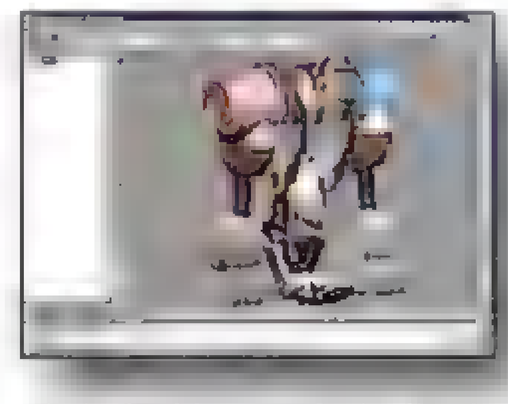
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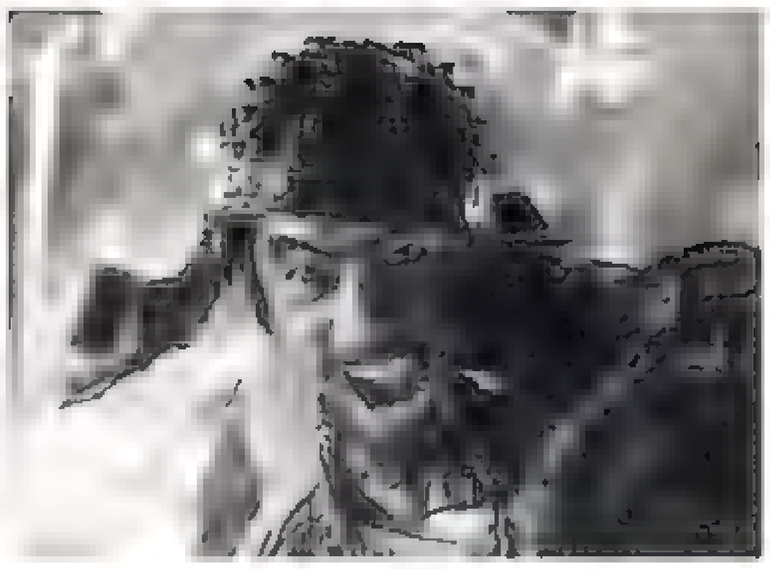
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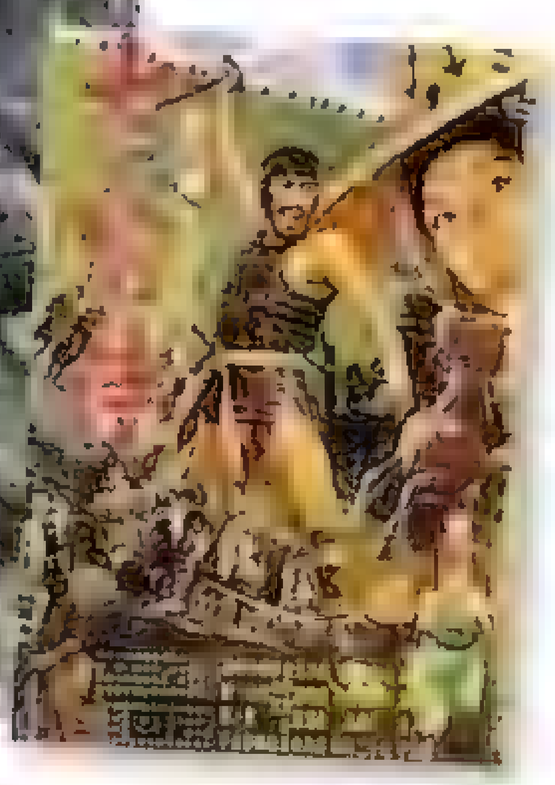
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The film is well worth tracking down for its climactic battle scene

Kurosawa's masterpiece still resonates with modern movie fans

Images © 1954 Toho Studios

Drawing swords

VFX supervisor Nicolas Aithadi relates how his creative journey began with Kurosawa's Seven Samurai

My Inspiration
Leading artists reflect on the work that shaped their lives in 3D



About the author
Nicolas Aithadi

Although I grew up with films like Star Wars and other movies of that type, it would be wrong to say that they inspired my career. I enjoyed watching them, but I was very young at the time, and I'm sure I wanted to be a fireman or a cowboy. Images in general have always fascinated me, be it a film, painting or comic book; drawing was the only thing I knew how to do, and my career in visual effects evolved organically from my early days as an illustrator.

A film that did have a significant effect on me was Seven Samurai by Akira Kurosawa. I was around 10 years old when I first saw it: my father was very much into classic films and he insisted that I watch it. At the time, I saw it simply as a great adventure movie; it was only when I grew up that I started to see other things coming to the surface: the way Kurosawa tells stories without the need for dialogue, the camera work and use of long lenses. But none of this was what made an impact on me, as I wasn't aware enough at the time to realise how masterfully the film was crafted. (Or maybe I was on an unconscious level.) What stayed with me was the action, and the characters and how cool they were. These were the same stimuli I found later in films like the Dirty Dozen or the Magnificent Seven, the best remake ever made

This film only propelled me further into the world of images. CG came later, born from a need for movement when I was always frustrated by the stillness of the illustration I was creating. I had a go at a comic books when I was younger, and found myself disappointed when trying to convey motion with the still drawings: I would always end up with too many panels per page

CG allowed me to add another dimension through the motion I craved. When I saw for the first time that you could animate using a computer, I was sold and completely abandoned drawing by hand. I worked my way from industrial work to commercials to film work, and I've been doing this ever since.

Seven Samurai influenced me then, and still does today. I often look back at the film and find camera moves, composition and lenses that inspire my work. Even though you are trying to find yourself and your own unique take on things, you can't escape from what made your artistic education. You don't want to photocopy a specific style, but I think it's a good thing to look at past work for inspiration.

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CGSOCIETY

Stop-motion sickness

Roy is determined to expose the ugly truth about the animation industry – if only so that he doesn't have to endure any more dodgy graduate showreels

The Americans love to bang on about creating the world's best TV comedy. Curb Your Enthusiasm, Seinfeld, Married With Children, Frasier, Friends, Arrested Development, The Simpsons... Yeah, yeah, we get it. But it took a British comedy show to reveal the dark comic truth at the heart of the entire animation industry.

Aired in the late 1990s as the genius of Aardman was just starting to gain worldwide acclaim, a sketch on quickfire comedy series The Fast Show featured a mock interview with a nerdish animator quite clearly modelled on dear old Nick Park. Offering some behind-the-scenes insight to a bright-eyed interviewer, he proceeds to methodically and painfully describes how a good day's work yields just one second of footage, with animation for just two frames of film involving moving a clay character's hand "just a tiny amount", then a single finger "just a tiny amount", an eyebrow "just a tiny amount", and on, and on, and finally onto the next two frames, until the interviewer his enthusiasm by now visibly evaporated to be replaced by a priceless mixture of boredom and contempt, finally backs away, turns to the cameraman and whispers the punchline: "Anyone fancy a pint?"

What makes the scene so painfully funny is the ugly truth of it. And what's true for stop-motion work goes double for computer animation, where the addition of so many more variables makes it perfectly feasible to waste your entire life trying to build, refine, procrastinate and generally piss around in search of one artistically satisfactory nanosecond of screen time. Let's be honest here. Animation is slow, tiresome, repetitive and about as far removed from the creative and dynamic end result as it's possible to imagine. It is, in short, a right royal pain in the arse.

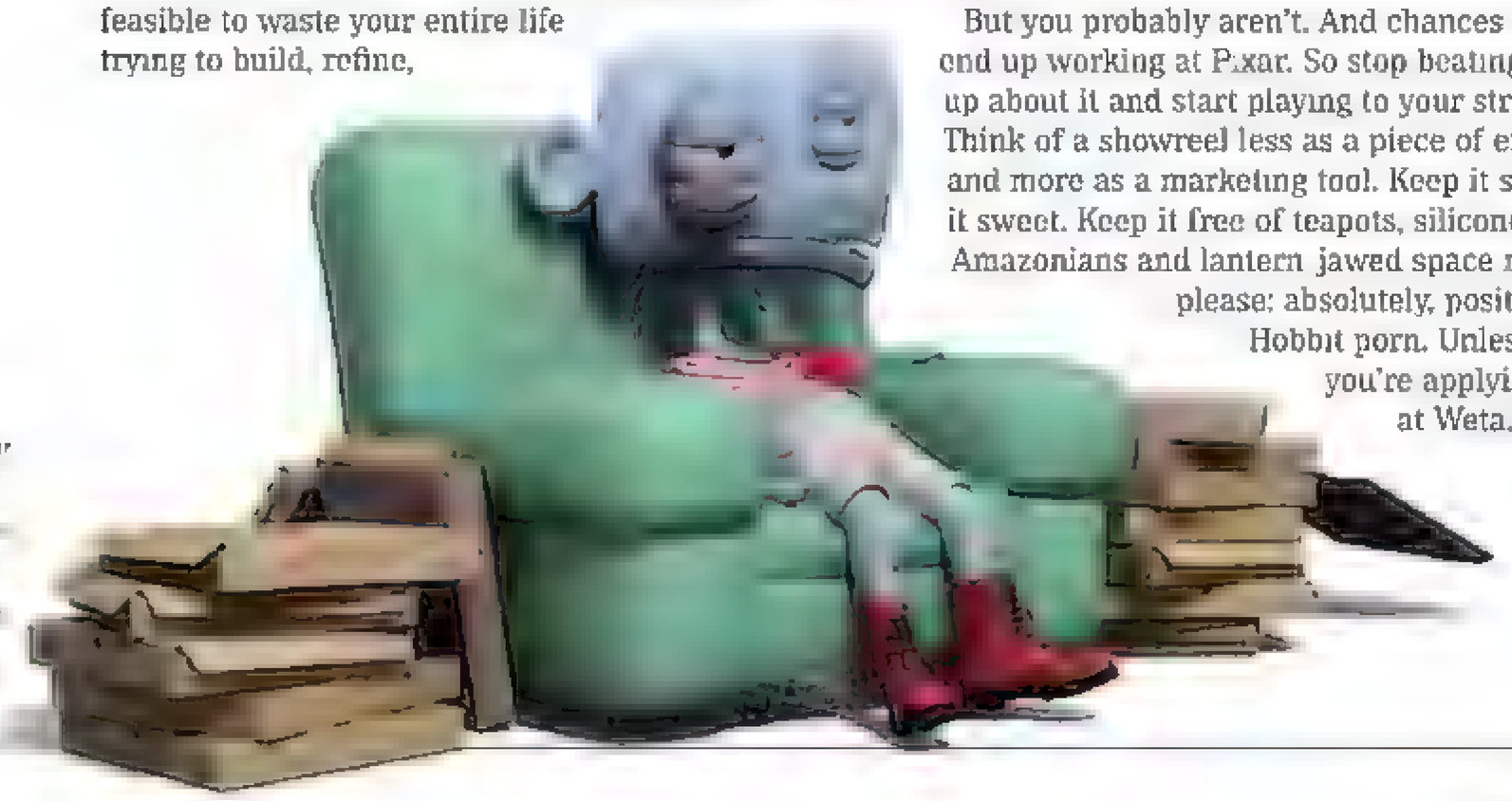
Pixar's Bobby Podesta recently admitted that a typical animator at the studio might produce just three minutes' worth of work in a single year. Three minutes. And that's likely to be just a fraction of what's visible in that miserly amount of screen time. The average artist will probably be lucky if he gets to play with *one* aspect of *one* background character in a scene – a character that's modelled, textured, lip-synched, enhanced with simulation work and lit by a whole team of other supporting players. About the only thing Buzz Lightyear doesn't have on hand to help with his performance is a fluffer...

Let's put this into perspective. The hot-shots at Pixar are probably the most experienced in the business. And yet even they don't have what it takes to handle a whole scene themselves or to conjure more than one second of usable footage per week.

So just why is it that so many graduates (and more experienced job-hunting artists who really should know better) insist on creating showreels with running times on a par with the average Peter Jackson Blu-ray Special Edition? You know, the ones where the Hobbit-pillow-fighting soft porn just goes on and on. Even worse, it's always the same idiots who fail to realise the idea is to show mastery of one or two key skills, *not* to prove that they've got what it takes to create the next one-man, must-see viral animation sensation.

When will people realise that the Victor Navones, Neill Blomkamps and Phil McNallys of this world aren't just unusual, they're total bloody statistical impossibilities? CG artists who can model, animate, texture, light, composite, edit and direct, *and* have the time and patience to put together an entire short film single-handed are freaks of nature. We should be dissecting these annoyingly clever bastards in a lab to better learn their secrets, not treating them as role models. If you hope to emulate these guys then you're doomed to failure. Unless, of course, you're a weirdo genius freak too.

But you probably aren't. And chances are you won't end up working at Pixar. So stop beating yourself up about it and start playing to your strengths. Think of a showreel less as a piece of entertainment and more as a marketing tool. Keep it short. Keep it sweet. Keep it free of teapots, silicone-chested Amazonians and lantern jawed space marines. And please: absolutely, positively, no Hobbit porn. Unless, of course, you're applying for a job at Weta. ●



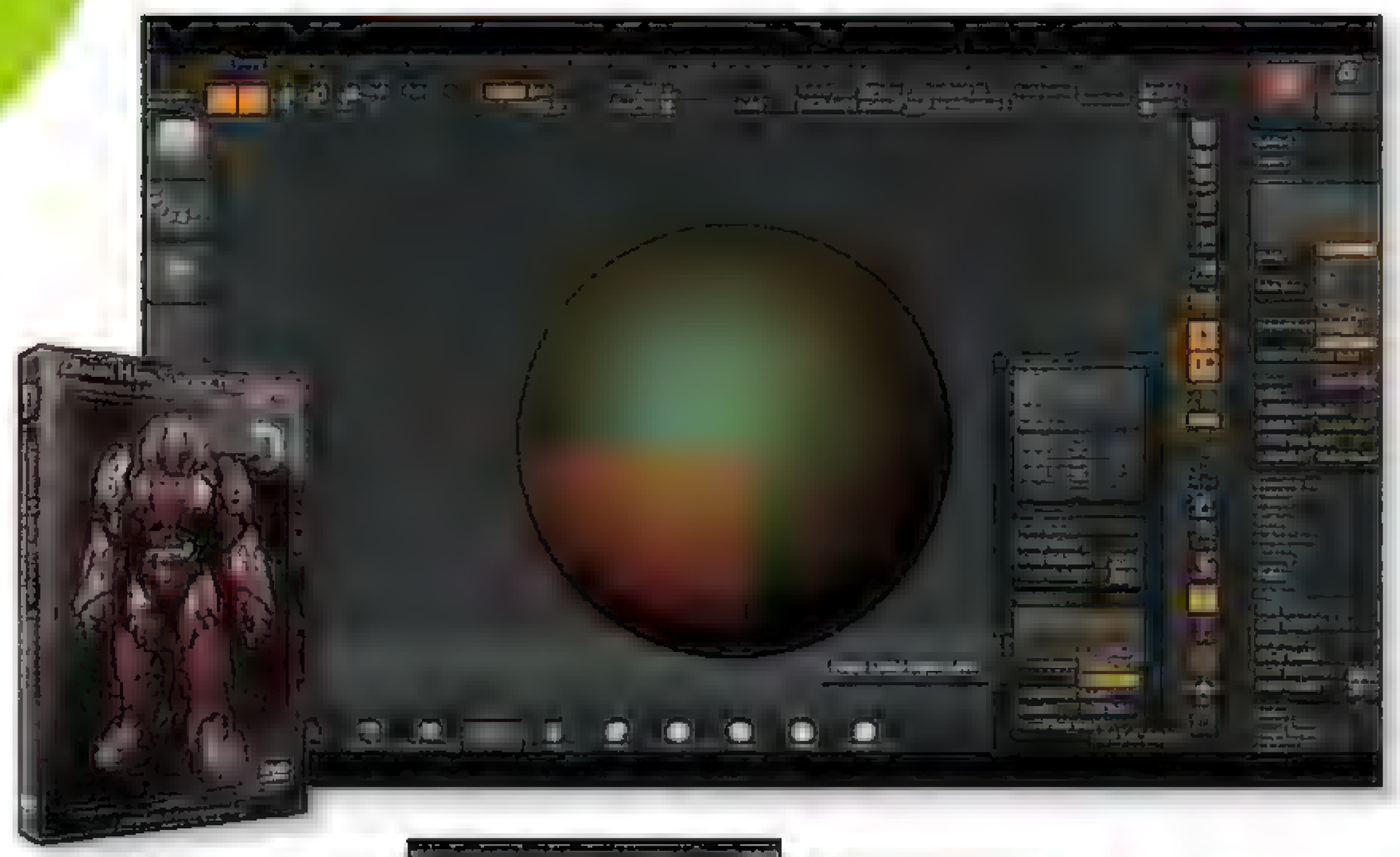


About the author
Mental Ray has been working on the fr[illegible]
but then we'd have to kill you
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On the disc



Three 3D models, 25 tree textures, 50 sound effects and ZBrush video training
Worth $208



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Tutorial files

The disc includes every scene files for this issue's tutorials, including our Maya and Mudbox guides. Visit **3dworldmag.com/142** to view the free accompanying videos.





Explore using ZBrush and creating hard surfaces with the video training on the disc

Eat 3D ZBrush video training

In the new training session ZBrush Hard Surface Techniques, Mike Jensen shows you how to sculpt a complete mechanical character in ZBrush. Mike takes you from concept mesh to the completed sculpt, before taking the result into 3ds Max for rendering.

The disc includes nearly an hour of video taken from this extensive training session. Early chapter samples show you how to set up the user interface and add stamps, while a chapter on legs explores working with hard surfaces in more depth.

ZBrush Hard Surface Techniques is available as a DVD, a download or a limited-period stream.

QuickTime Educational

eat3d.com

Having problems?

If you have problems using the disc interface, visit our support website at **futurenet.co.uk/support**. On this regularly updated site, you'll find solutions to many commonly reported problems. If you're still experiencing problems, email our support team at **support@futurenet.com**. If you have a broken or faulty disc, return it to the address on the back of the disc wallet.



A recreation of the iPhone 3GS is joined by two models inspired by SF film and TV

Worth $124
Three textured models for your illustrations



Panebianco3d models

Three textured models in LWO format

Via his Panebianco3d website, 3D artist Gianluca Panebianco offers models, textures and effects scenes such as particle emitters and fur. The three models on the disc comprise an iPhone 3GS for contemporary scenes; and for your personal sci-fi enjoyment, a Recognizer from the Tron franchise and Zureul from the anime series Neon Genesis Evangelion.

FORMAT LWO, LWS LICENCE Commercial

WEBSITE panebianco3d.com

Worth $25
25 photographic images for your arch-viz and outdoor scenes

3dRender tree imagery

25 high-res photographic tree images

Specialising in assets for visualisation projects, 3dRender offers imagery to enhance your renders in post and models to help populate your interiors. The disc includes the complete Pro-Viz Tree Textures Vol 3, with 25 photoreal trees for your renders. Provided in sizes up to 5,400 pixels high, each tree comes with an alpha map to enable easy foreground or background placement.

Two further Tree Textures volumes are available, along with sets including people, plants and skies. 3dRender also offers a wide range of natural and man-made surface textures.

FORMAT JPEG, PNG LICENCE Commercial

WEBSITE 3drender.co.uk

These high-res trees from 3dRender include alpha maps so you can add them to placards for speedy rendering

Soundsnap sound effects

50 effects for your animations or games

Soundsnap offers over 120,000 sound effects and royalty-free music loops, with many created by Hollywood sound designers and acclaimed DJs. The selection on the disc includes ambient and Foley sound effects and short and long music loops.

FORMAT WAV LICENCE Commercial WEBSITE soundsnap.com

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50 WAV sound effects
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Worth $59
Sound FX for animations and games

On your free disc

THIS ISSUE Assets worth $208, including three 3D models, 25 tree textures and 50 sound effects.
PLUS 59 minutes of ZBrush training from Eat 3D

Explore your disc
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Resources

Panebianco3d models
iPhone and two SF-inspired models, all in LWO and LWS formats

3dRender tree textures
Complete Pro-Viz Tree Vol 3, with 25 hi-res images for your visualisations

Soundsnap sound FX
50 ambient, Foley and musical WAV files for animation, games and virtual worlds

Video training

Eat 3D ZBrush training
59 minutes of hard surface video instruction from Mike Jensen

Tutorials

All the scene files you need for this issue's tutorials and Q&A section are on the disc. Visit **3dworldmag.com/142** for videos for this issue's tutorials and Q&As.

Is your disc missing?
Please consult your newsagent, then contact us to obtain a replacement
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Disc manufactured in the EU by Technicolor

For a full listing of our disc content this issue, including file formats and system requirements, turn to page 112

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bluegfx is Autodesk's No. 1 Reseller N.Europe, Media & Entertainment, with over 21 years of experience in supplying the commercial industry. We are an established business offering a range of 3D solutions including: Autodesk Media & entertainment software, workstations, render farms, servers, render management, storage and much more. All delivered with an excellent level of professional service and support.

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"10 years ago I moved on from traditional art to 3d and bluegfx has been there every step of the way with all my support needs. As a freelancer working from home, it's essential to still feel part of a team otherwise it can be quite isolating. bluegfx provides me with the latest products, seminars, training and support workshops which are enjoyable and informative and it also gives me a chance to network with other 3d artists. The service bluegfx provides me with is invaluable and knowing there is always someone to bounce ideas off and work through any technical problems makes the sometimes insular world of freelancing more like playing in a team! Thanks bluegfx".

David Penfound.
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